Traffic Impact Study

Mill Creek at Sandy Springs

Sandy Springs, Georgia

Report Prepared:

March 2015

Prepared for:

Mill Creek Residential Trust, LLC

Prepared by:

Kimley-Horn and Associates, Inc.
817 West Peachtree Street, NW, Suite 601
Atlanta, GA 30308

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1.0 INTRODUCTION

This report presents the analysis of the anticipated traffic impacts associated with the proposed Mill Creek at Sandy Springs development, a residential development including 450 multi-family residential apartments and 35,000 SF of retail space. The 5.11 acre site is bordered by Roswell Road to the west, Boylston Drive to the east, Hilderbrand Drive to the north, and a potential future road to the south in Sandy Springs, Georgia.

The existing development is approximately 72,000 SF of retail space. This development is currently accessed by two full-movement driveways on Roswell Road (SR 9), two full-movement driveways on Hilderbrand Drive, and one full-movement driveway on Boylston Drive. Per discussion with Sandy Springs staff, no trip credit was taken for this existing development. This methodology is considered a conservative approach.

The proposed development will be served by the following driveways:

- Driveway #1: A proposed, full movement or right-in/right-out (RIRO) driveway on Roswell Road (analyzed as a right-in/right-out driveway at the request of Sandy Springs staff),
- Driveway #2: A proposed, full-movement driveway on Hilderbrand Drive
- Driveway #3: A proposed, full-movement driveway on the potential future road ("New Road")
- Driveway #4: A full-movement driveway on Boylston Drive

New Road and the internal streets within the development (Driveways #1, #2, and #3) will have on-street, parallel parking spaces along both sides of these roadways. Hildebrand Drive will have on-street, parallel parking on the south side of the roadway along the length of the proposed development. Boylston Drive will also have on-street, parallel parking on the west side of the roadway across from the proposed Driveway #4. The Mill Creek at Sandy Springs development is proposed to be completed and open to traffic by year 2017. **Figure 1** provides a location map and **Figure 2** provides aerial imagery of the proposed site. Additionally, a copy of the proposed site plan is provided in **Appendix A**.

2.0 STUDY AREA DETERMINATION

After conversations with Sandy Springs staff, the study area was chosen to include the following intersections:

1. Roswell Road (SR 9) at Hilderbrand Drive (signalized)
2. Boylston Drive at Hilderbrand Drive (unsignalized)
3. Roswell Road (SR 9) at New Road – Proposed
4. Roswell Road (SR 9) at Proposed Driveway #1 – Proposed

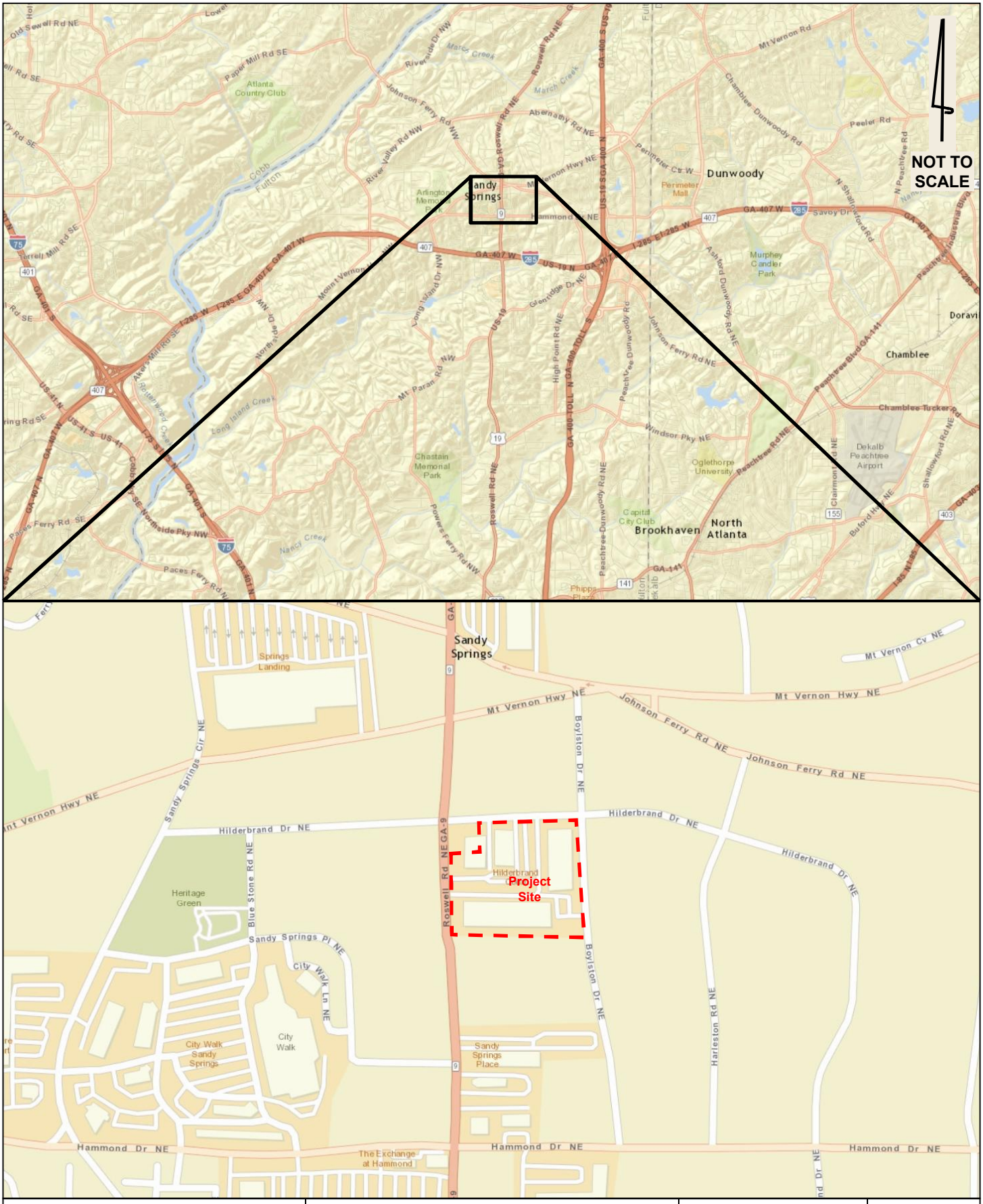
5. Proposed Driveway #2 at Hilderbrand Avenue – Proposed
6. Boylston Drive at New Road – Proposed
7. Driveway #3 at New Road – Proposed
8. Driveway #4 at Boylston Drive - Proposed

There are four proposed driveways to the site; one driveway that will either be a full-movement or RIRO and three full-movement driveways. Proposed Driveway #1 (either full-movement or RIRO) intersects Roswell Road (SR 9) approximately 225' south of the intersection with Hilderbrand Drive. This driveway was analyzed as RIRO at the request of the City of Sandy Springs. Proposed Driveway #2 (full-movement) intersects Hilderbrand Drive approximately 250' to the east of the intersection with Roswell Road. Proposed Driveway #3 (full-movement) intersects New Road to the south of the proposed site approximately 240' east of Roswell Road (SR 9). Proposed Driveway #4 (full-movement) intersects Boylston Drive to the east of the proposed site approximately 250' south of Hilderbrand Drive. In addition to studying these driveways, the proposed intersections on New Road with Roswell Road (SR 9) and Boylston Drive are included in build-out analysis. Site photographs were collected at the location and are provided in **Appendix B.**

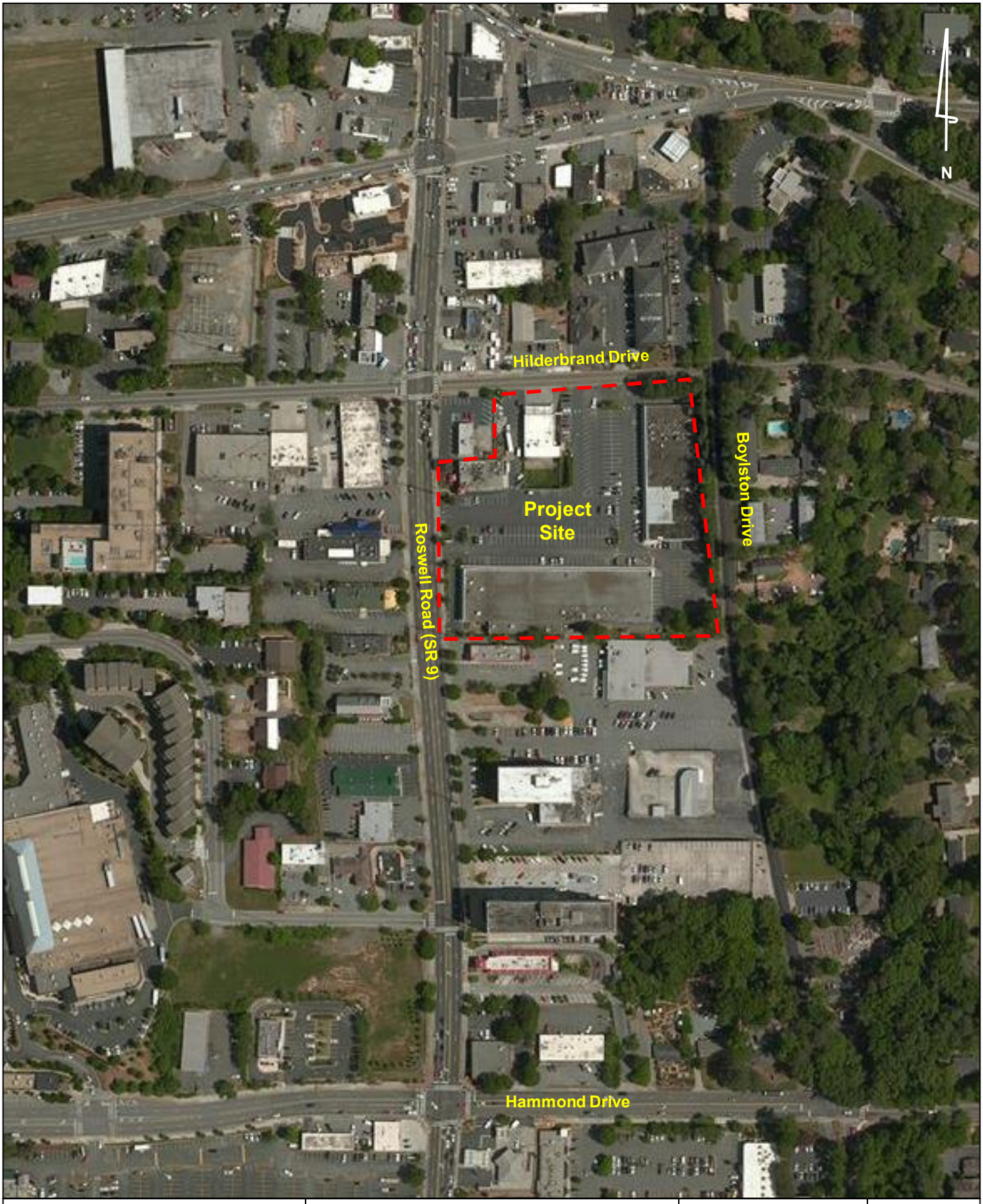
3.0 EXISTING TRAFFIC CONDITIONS

Roswell Road (SR 9) is a five-lane undivided roadway with a 2013 AADT reported by GDOT of 37,910 vehicles per day south of the site and a posted speed limit of 35 MPH. Hilderbrand Drive is a two-lane undivided roadway with a posted speed limit of 35 MPH in the vicinity of the site. Boylston Drive is a two-lane undivided roadway with a posted speed limit of 30 MPH. Vehicle AM and PM peak hour turning movement counts were performed at the study intersections on Wednesday, January 28, 2015. The raw counts are provided in **Appendix E**. **Figure 3** illustrates the Existing 2015 peak hour traffic volumes.

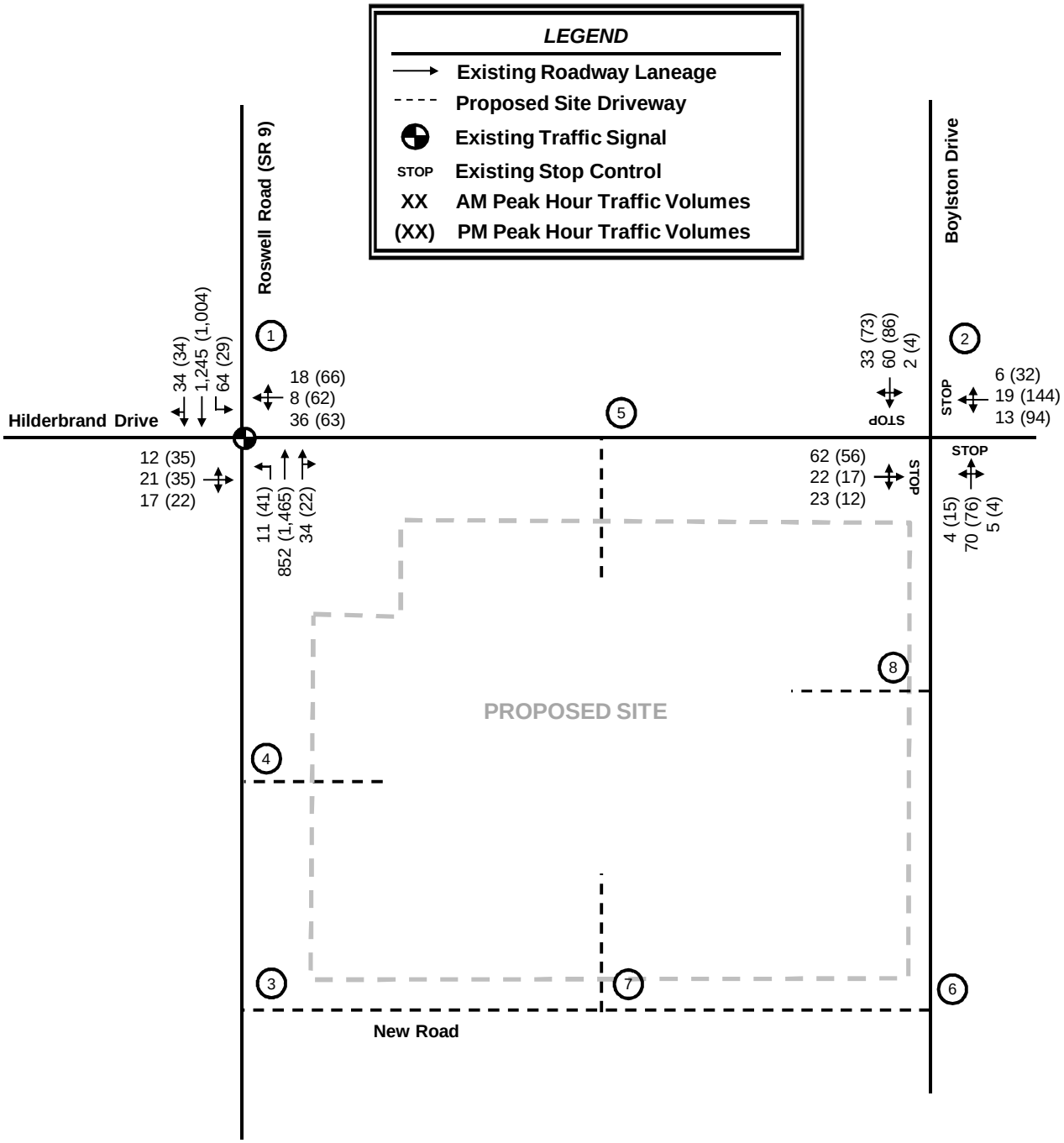
For all analysis scenarios, 20 bus blockages per hour were assumed along Roswell Road (SR 9), per coordination with the City of Sandy Springs. These blockages were assumed to impact the northbound and southbound through and right-turning movements for all intersections modeled along Roswell Road.



Kimley»Horn	**Mill Creek at Sandy Springs Traffic Impact Study**	**Site Location**	**Figure 1**



Kimley»Horn	**Mill Creek at Sandy Springs Traffic Impact Study**	**Site Aerial**	**Figure 2**



NOT TO SCALE

Kimley»Horn	Mill Creek at Sandy Springs Traffic Impact Study	Existing 2015 Traffic Conditions	Figure 3

4.0 PROJECTED BACKGROUND (NON-PROJECT) TRAFFIC

Projected background (non-project) traffic is defined as the expected traffic on the roadway network in the future year(s) absent the construction and opening of the proposed project. The Existing 2015 peak hour traffic volumes were increased by 2% per year for two years to account for the expected background growth in traffic to 2017. **Figure 4** illustrates the Projected 2017 No-Build traffic volumes (which does not include traffic associated with the proposed Mill Creek at Sandy Springs development). These improvements are further discussed in Section 6.0.

4.1 FUTURE ROADWAY/INTERSECTION PROJECTS

The *Sandy Springs City Center Master Plan* (and combined *10 Year LCI Update;* 2012) identifies two transportation-related factors which impact the project site:

- A new east-west street connection is recommended in the City's plan with a proposed signalized intersection at Roswell Road (SR 9). The proposed project site plan accommodates this connection.
- A north-south alley, or internal drive, is recommended within the project site extending between Hilderbrand Drive and the new street connection. The proposed project site plan accommodates this connection.

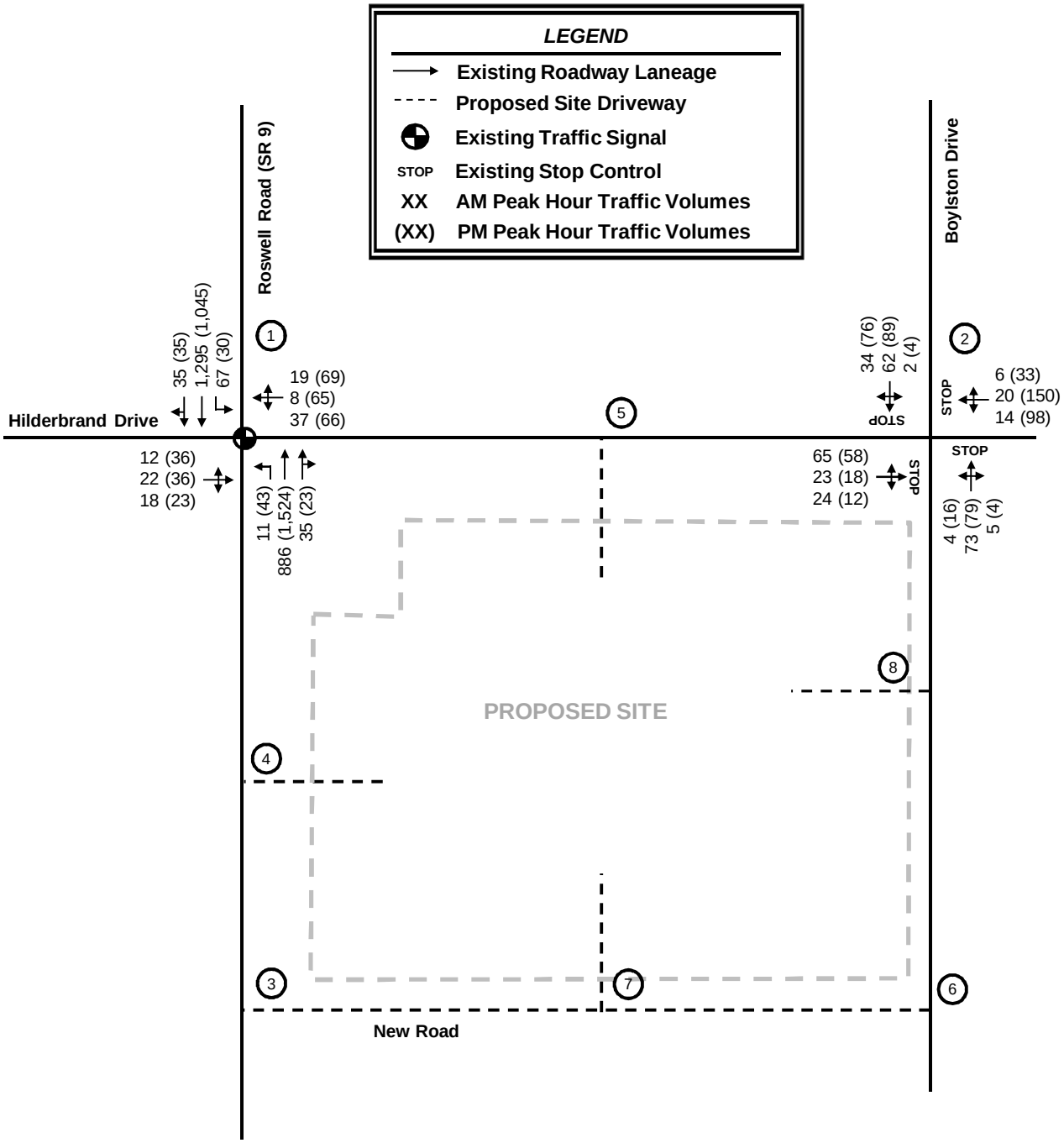
Additionally, per discussion with the City, a signal at the intersection of Roswell Road (SR 9) and New Road was not included in this analysis. While this signal may be warranted due to future development, it was not considered necessary at this time.

The Atlanta Regional Commission's *Transportation Improvement Program,* which is updated every quarter, identifies one funded project adjacent to the project site. Roswell Road is programmed to receive signal equipment upgrades from Atlanta's city limits to Abernathy Road as part of project FN-282. This project is not expected to impact signal operations at the intersection of Roswell Road and Hilderbrand Drive. Fact sheets for the future roadway/intersection projects are include in **Appendix F**.

5.0 PROJECT TRAFFIC

Project traffic used in this analysis is defined as the vehicle trips expected to be generated by the development and the distribution and assignment of that traffic through the study roadway network. This traffic impact study evaluates the impacts of a development with 450 multi-family residential apartments and 35,000 SF of retail space.

Per discussion with Sandy Springs staff, no trip credit was taken for this existing 75,000 SF retail development. This methodology is considered a conservative approach.



NOT TO SCALE

Kimley»Horn	Mill Creek at Sandy Springs Traffic Impact Study	Projected 2017 No-Build Traffic Conditions	Figure 4

5.1 PROJECT SITE ACCESS

Access to the proposed Mill Creek at Sandy Springs development will be provided at four proposed locations, which are shown on the site plan in **Appendix A**. A brief description of each proposed access point follows:

1. Proposed Driveway #1 – a proposed, unsignalized, side-street stop controlled, RIRO driveway on Roswell Road located approximately 225' south of the intersection of Roswell Road and Hilderbrand Drive. This driveway was analyzed as RIRO at the request of the City of Sandy Springs.

2. Proposed Driveway #2 – a proposed, unsignalized, side-street stop controlled, full-movement driveway on Hilderbrand Drive located approximately 250' to the east of the intersection of Roswell Road and Hilderbrand Drive.

3. Proposed Driveway #3 – a proposed, unsignalized, side-street stop controlled, full-movement driveway on New Road located approximately 250' to the east of the intersection of Roswell Road and New Road.

4. Proposed Driveway #4 – a proposed unsignalized, side-street stop controlled, full-movement driveway on Boylston Drive located approximately 250' to the south of the intersection of Hilderbrand Road with Boylston Drive.

It should be noted that the existing retail development has five access points, and the proposed development will consolidate that access to four locations.

5.2 TRIP GENERATION

Traffic for the proposed development was calculated using equations contained in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, Ninth Edition, 2012. The trip generation was calculated assuming 450 multi-family residential apartments (Land Use 220) and 35,000 SF of retail space (Land Use 820). **Table 1** summarizes the trip generation for the proposed development under full build-out (year 2017).

For the purposes of a more conservative analysis, alternative mode reductions, such as walking, biking, and transit, were not taken. Internal capture (mixed-use reductions) and pass-by reductions were taken due to the proposed development containing residential and retail land uses.

Table 1 Mill Creek at Sandy Springs Project Trip Generation Summary							
Land Use	**ITE Code**	**Daily Traffic**		**AM Peak Hour**		**PM Peak Hour**	
		Enter	**Exit**	**Enter**	**Exit**	**Enter**	**Exit**
450 Multi-Family Apartments	*220*	1,426	1,425	45	179	172	93
35,000 SF Retail	*820*	1,716	1,716	51	31	143	154
Total New Trips		**3,142**	**3,141**	**96**	**210**	**315**	**247**
Internal Capture Trips		*-574*	*-574*	*-3*	*-3*	*-54*	*-54*
Pass-by Trips		*-60*	*-60*	*0*	*0*	*-60*	*-60*
Net New External Trips		**2,508**	**2,507**	**93**	**207**	**201**	**133**

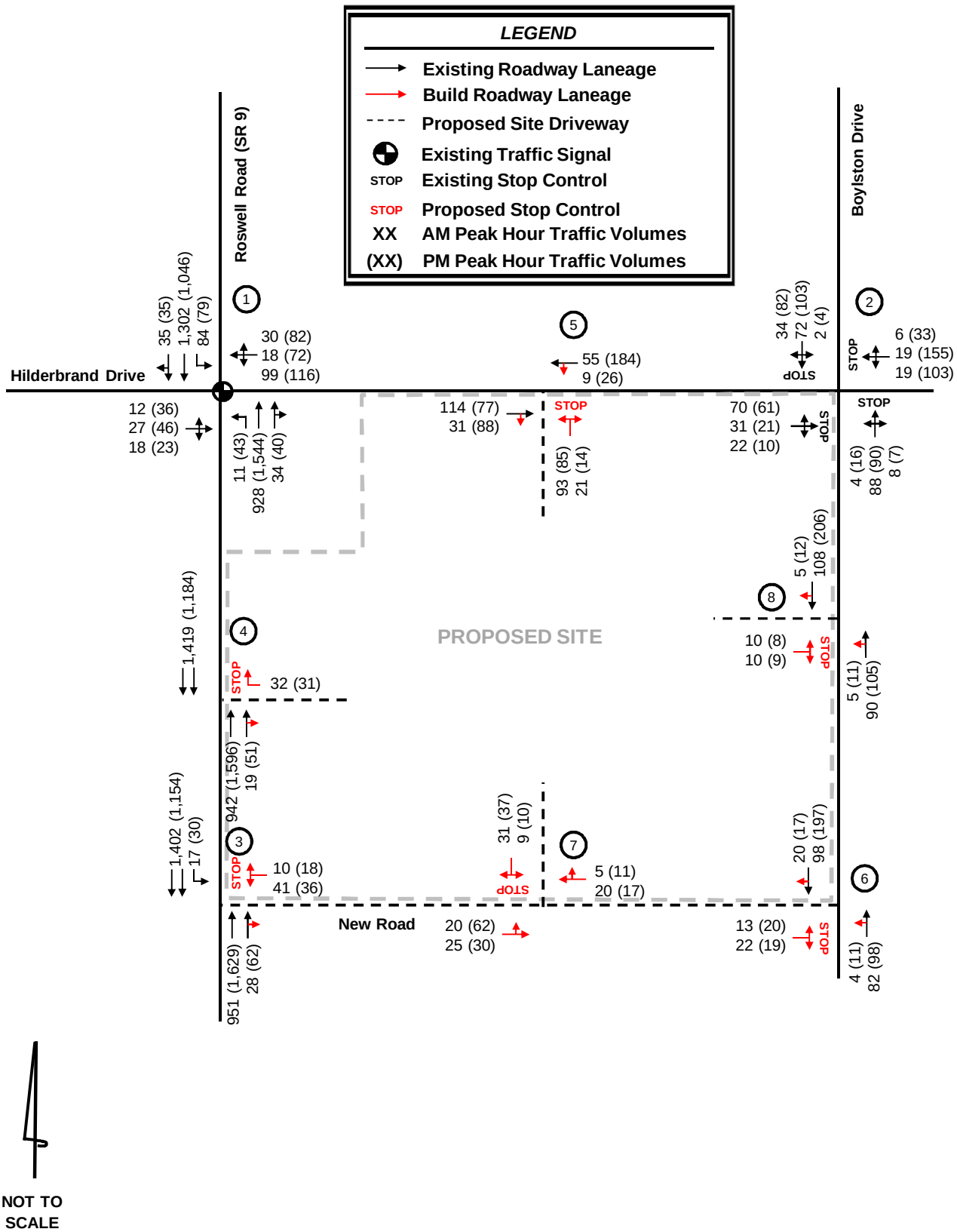
5.3 TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution and assignment of new project trips were based on a review of land uses and population densities in the area, and the existing peak hour turning movement counts. Of the project traffic, 25% was assigned to/from the north on Roswell Road (SR 9), 10% to/from the north on Boylston Drive, 5% to/from the east on Hilderbrand Drive, 5% to/from the south on Boylston Drive, 50% to/from the south on Roswell Road (SR 9), and 5% to/from the west on Hilderbrand Drive.

Based on the trip generation from Table 1 and the anticipated trip distribution, new project trips were assigned to the study roadway network. **Figure 5** illustrates the projected 2017 Projected Build traffic conditions with proposed access and roadway connections for the AM and PM peak hours. **Appendix C** provides intersection volume worksheets for all intersections and driveways within the study network.

5.4 REDISTRIBUTION OF EXISTING TRAFFIC

With the construction of New Road in the 2017 Projected Build condition, existing trips were reassigned from their existing travel paths to utilize the new connection. These trips did not include vehicles utilizing the site. Northbound trips on Roswell Road (SR 9), southbound trips on Roswell Road (SR 9), and westbound trips from the intersection of Boylston Drive at Hilderbrand Drive were reassigned. It was assumed that some trips from these directions would utilize New Road to avoid the intersection of Roswell Road (SR 9) at Hilderbrand Drive. Ten trips from each direction were reassigned. These redistributed trips are included in the volumes reported on **Figure 5**.



Kimley»Horn	Mill Creek at Sandy Springs Traffic Impact Study	Projected 2017 Build Traffic Conditions	Figure 5

6.0 LEVEL-OF-SERVICE ANALYSIS

Level-of-service determinations were made for the weekday AM and PM peak hours for the existing study network intersections and proposed driveways using *Synchro Professional, Version 8.0*. The program uses methodologies contained in the *2010 Highway Capacity Manual* to determine the operating characteristics of an intersection. Capacity is defined as the maximum number of vehicles that can pass over a particular road segment or through a particular intersection within a specified period under prevailing roadway, traffic, and control conditions.

Level-of-service (LOS) is used to describe the operating characteristics of a road segment or intersection in relation to its capacity. LOS is defined as a qualitative measure that describes operational conditions and motorists' perceptions of a traffic stream. The *Highway Capacity Manual* defines six levels of service, LOS A through LOS F, with A being the best and F the worst.

For the purposes of this traffic impact study, an acceptable level-of-service for signalized intersections was considered to be LOS D or better. This assumption is consistent with local and state agency review standards for the study area.

Levels-of-service for unsignalized intersections, with stop-control on the minor street(s) only, are reported for the side street approaches. Low levels-of-service for the side street approaches are not uncommon, as vehicles may experience a delay turning onto a major roadway.

Levels-of-service for signalized intersections and all-way stop controlled unsignalized intersections are reported for the intersection as a whole. One or more movements at an intersection may experience a low level-of-service, while the intersection as a whole may operate acceptably.

In addition to the Existing 2015 traffic conditions, an analysis was performed for the AM and PM peak hours for the Projected 2017 No-Build traffic conditions and the Projected 2017 Build traffic conditions. The results of the LOS analysis are summarized in **Table 2**. A detailed set of the analyses from *Synchro* is available in **Appendix D**.

Table 2 Mill Creek at Sandy Springs Level-of-Service Summary LOS (Delay in Seconds)							
Intersection	**Approach**	**Existing 2015**		**Projected 2017 No-Build**		**Projected 2017 Build**	
		AM Peak	**PM Peak**	**AM Peak**	**PM Peak**	**AM Peak**	**PM Peak**
1. Roswell Road (SR 9) at Hilderbrand Drive (Signalized)	Overall	A (9.1)	C (21.7)	A (9.3)	C (22.4)	B (16.6)	C (34.7)
2. Boylston Drive at Hilderbrand Drive (Unsignalized)	EB	A (8.1)	A (8.9)	A (8.2)	A (9.0)	A (8.5)	A (9.3)
	WB	A (7.7)	B (11.0)	A (7.8)	B (11.3)	A (7.9)	B (12.0)
	NB	A (7.9)	A (9.1)	A (8.0)	A (9.3)	A (8.2)	A (9.6)
	SB	A (7.8)	A (9.4)	A (7.8)	A (9.5)	A (8.0)	B (10.0)
3. Roswell Road (SR 9) at New Road (Unsignalized)	WB	n/a	n/a	n/a	n/a	C (20.2)	E (43.7)
4. Roswell Road (SR 9) at Driveway #1 (Unsignalized)	WB	n/a	n/a	n/a	n/a	B (13.8)	C (21.3)
5. Driveway #2 at Hilderbrand Drive (Unsignalized)	NB	n/a	n/a	n/a	n/a	B (10.5)	B (11.9)
6. Boylston Drive at New Road (Unsignalized)	EB	n/a	n/a	n/a	n/a	A (9.3)	B (10.3)
7. Driveway #3 at New Road (Unsignalized)	SB	n/a	n/a	n/a	n/a	A (8.7)	A (8.9)
8. Driveway #4 at Boylston Drive (Unsignalized)	EB	n/a	n/a	n/a	n/a	A (9.5)	B (10.2)

The signalized intersection operates at LOS C or better upon 2017 Projected Build conditions. The standard acceptable threshold for signalized intersections operates at LOS D or better. Also, all unsignalized intersection approaches are expected to operate at an acceptable level of service and, therefore, no improvements are recommended for capacity purposes in this study area. Although the westbound approach of New Road is expected to operate at LOS E during the Projected 2017 Build PM condition, it is not uncommon for minor side-street approaches to experience delays at the major street

during peak hours. With the presence of several other driveways below capacity, and alternative routes south of the site, drivers are expected to reroute themselves if they will experience significant delays at this intersection.

7.0 TURN LANES

At the request of Sandy Springs staff, the proposed and driveways as well as the offsite study intersections were reviewed under Projected 2017 Build conditions to determine if any of the turning movements at these locations exceed the guideline thresholds set by GDOT and Sandy Springs for the installation of turn lanes. These guideline thresholds are exceeded at several off-site intersection locations throughout the study area; however, based on the location and context of the project site within the planned Sandy Springs City Center district, it is recommended that no turn lanes be added to the study intersections.

The American Association of State Highway and Transportation Officials' (AASHTO) design manual *A policy on Geometric Design of Highways and Streets, 6th Edition (2011)* explains that, "Warrants for the use of auxiliary lanes cannot be stated definitely." Many factors should be considered when discussing the appropriateness of turn lanes. The AASHTO manual goes on to say, "Turn lanes are warranted on high-speed and on high-volume highways where a change in speed is needed for vehicles entering or leaving the through-traffic lanes."

Based on the following factors, turn lanes are not recommended at any of the study intersections analyzed in this report:

- None of the roadways within the study area are intended to be both high-volume and high-speed roadways. Although Roswell Road (SR 9) is considered high-volume, this roadway is not intended to operate at high speeds within the City Center area of Sandy Springs.
- All of the intersections operate at an acceptable level-of-service without the addition of auxiliary turn lanes.
- There is precedence for not installing additional auxiliary lanes within the study area. The majority of existing nearby intersections and driveways along Roswell Road (SR 9) do not have auxiliary turn lanes (with the exception of the existing two-way left-turn lane which will continue to operate in the same manner that it does today).
- The installation of turn lanes is expected to reduce safety for pedestrians because turn lanes increase crossing distances for pedestrians and travel speeds for vehicles.

Intersection 3 – Roswell Road (SR 9) at New Road (Unsignalized)

- Westbound right-turn lane
- Westbound left-turn lane
- Northbound right-turn lane

Intersection 6 - Boylston Drive at New Road (Unsignalized)

- Eastbound right-turn lane
- Southbound right-turn lane

As shown above, several off-site intersection locations throughout the study area exceed the guideline thresholds set by GDOT and Sandy Springs. However, based on the location and context of the project site within the planned Sandy Springs City Center district, it is recommended that no turn lanes be added to the study intersections. The American Association of State Highway and Transportation Officials' (AASHTO) design manual *A policy on Geometric Design of Highways and Streets, 6th Edition (2011)* explains that, "Warrants for the use of auxiliary lanes cannot be stated definitely." Many factors should be considered in the consideration of the appropriateness of turn lanes. The AASHTO manual goes on to say, "Turn lanes are warranted on high-speed and on high-volume highways where a change in speed is needed for vehicles entering or leaving the through-traffic lanes."

Based on the following factors, turn lanes are not recommended at any of the study intersections analyzed in this report:

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- All of the intersections operate at an acceptable level-of-service without the addition of auxiliary turn lanes.
- There is precedence for not installing additional auxiliary lanes within the study area. The majority of existing nearby intersections and driveways along Roswell Road (SR 9) do not have auxiliary turn lanes (with the exception of the existing two-way left-turn lane which will continue operate in the same manner that it does today).
- The installation of turn lanes is expected to reduce safety for pedestrians because turn lanes increase crossing distances for pedestrians and travel speeds for vehicles.

8.0 CONCLUSION

As currently envisioned, the Mill Creek at Sandy Springs development will consist of 450 multi-family residential apartments and 35,000 SF of retail space. The 5.11 acre site is bordered by Roswell Road to the west, Boylston Drive to the east, Hilderbrand Drive to the north, and a potential future road to the south in Sandy Springs, Georgia. The study network, comprised of one existing signalized intersection, one existing unsignalized intersection, four proposed unsignalized driveway intersections, and two new unsignalized intersections (created by the New Road) were analyzed for the Existing 2015 traffic conditions, the Projected 2017 No-Build traffic conditions (background traffic growth), and the Projected 2017 Build conditions (background traffic growth plus the proposed development traffic).

The signalized intersection is projected to operate at LOS C or better during Projected 2017 Build AM and PM peak hours. For the purposes of this traffic impact study, an acceptable level-of-service for signalized intersections was considered to be LOS D or better. This assumption is consistent with local and state agency review standards for the study area.

All unsignalized intersection approaches are also expected to operate at an acceptable level of service.

Although some of the study area intersections approaches exceed the turn lane volume thresholds for GDOT and the City of Sandy Springs, no auxiliary turn lanes are recommended due to the urban context that is desired in the planned City Center area.

8.1 GENERAL RECOMMENDATIONS

Based on the results of this study (which assumes the construction of the New Road as a two-lane undivided roadway), Kimley-Horn and Associates, Inc. recommends the following to serve the Projected 2017 Build Conditions (improvements needed to serve the proposed development traffic):

Intersection 3 – Roswell Road (SR 9) at New Road (full-movement, minor-street stop control):

- Provide a single full-movement westbound approach lane at Roswell Road (SR 9)

Intersection 4 – Roswell Road (SR 9) at Proposed Driveway #1 (full-movement or RIRO, minor-street stop control):

- Construct this driveway as either a full movement driveway or right-in/right-out only access
    - It should be noted that this intersection was analyzed as a right-in/right-out driveway at the request of the City of Sandy Springs. This driveway was also analyzed as a full-movement access and operates at an acceptable LOS configured as such.

Intersection 5 – Proposed Driveway #2 at Hilderbrand Drive (full-movement, minor-street stop control):

- Construct one full-movement egress lane exiting the site and one ingress lane entering the site.

Intersection 6 – Boylston Drive at New Road (full-movement, minor-street stop control):

- Provide a single full-movement eastbound approach lane at Boylston Drive

Intersection 7 – Proposed Driveway #3 at New Road (full-movement, minor street stop control)

- Construct one full-movement egress lane exiting the site and one ingress lane entering the site.

Intersection 8 – Proposed Driveway #4 at Boylston Drive (full-movement, minor street stop control)

- Construct one full-movement egress lane exiting the site and one ingress lane entering the site.

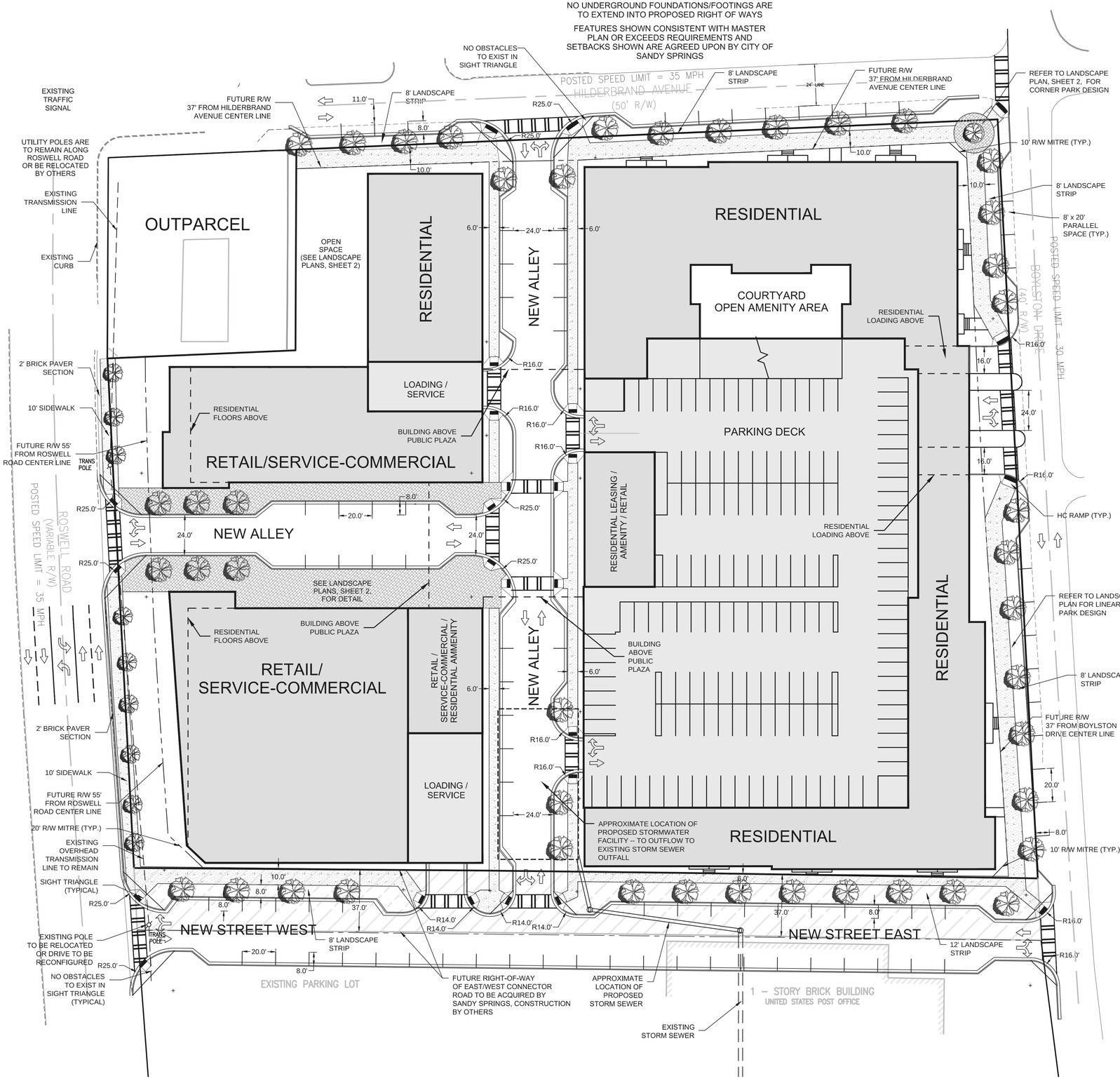
Although some of the study area intersection approaches exceed the guideline turn lane volume thresholds recommended by GDOT and the City of Sandy Springs, no auxiliary turn lanes are recommended here due to the urban context that is desired in the planned City Center area. Overall, the proposed access and layout for the project site are in keeping with the character and context of a walkable downtown district as is recommended in the *Sandy Springs City Center Master Plan*.

APPENDIX A

Site Plan

BUILDING SETBACKS FROM FUTURE RIGHT OF WAYS ARE AS FOLLOWS:
ROSWELL ROAD: MINIMUM 10 FEET
BOYLSTON DRIVE: MINIMUM 3 FEET
HILDERBRAND AVENUE: MINIMUM 3 FEET
NEW ROAD: MINIMUM 3 FEET
NO UNDERGROUND FOUNDATIONS/FOOTINGS ARE TO EXTEND INTO PROPOSED RIGHT OF WAYS

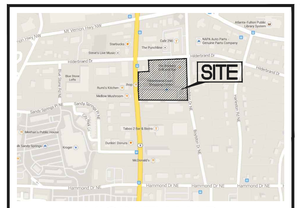
FEATURES SHOWN CONSISTENT WITH MASTER PLAN OR EXCEEDS REQUIREMENTS AND SETBACKS SHOWN ARE AGREED UPON BY CITY OF SANDY SPRINGS



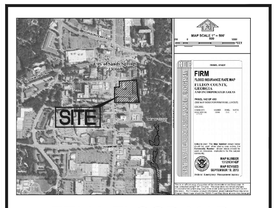
DEVELOPMENT STATISTICS SUMMARY CHART

TOTAL SITE AREA	**5.11 AC**	**222,242 SF**
RETAIL/RESIDENTIAL AMENITY/OFFICE/RESTAURANT/SERVICE		UP TO 40,000 GSF
RESIDENTIAL UNITS PROPOSED		UP TO 400 UNITS
PARKING REQUIREMENTS		
MINIMUM PARKING REQUIRED FOR RETAIL/ETC. (PER MAIN STREET OVERLAY)		
PARKING REQUIRED FOR RETAIL/ETC. (1.5 / 1000SF)		60 SPACES
MAXIMUM PARKING REQUIRED FOR RETAIL/ETC. (PER MAIN STREET OVERLAY)		
PARKING REQUIRED FOR RETAIL/ETC. (7.5 / 1000SF)		300 SPACES
(ASSUMED AVG. OF 5 / 1000 SF FOR RETAIL & 10 / 1000 SF FOR RESTAURANT)		
RESIDENTIAL UNITS PROPOSED		**UP TO 400 UNITS**
MINIMUM PARKING REQUIRED FOR RESIDENTIAL (PER MAIN STREET OVERLAY)		
1.0 SPACE/UNIT (400 x 1.0 SPACE)		400 SPACES
MAXIMUM PARKING REQUIRED FOR RESIDENTIAL (PER MAIN STREET OVERLAY)		
2.25 SPACES/UNIT (400 x 2.25 SPACES)		900 SPACES
TOTAL MINIMUM PARKING REQUIRED		
RETAIL/RESIDENTIAL AMENITY/OFFICE/RESTAURANT/SERVICE		60 SPACES
RESIDENTIAL		400 SPACES
TOTAL		460 SPACES
TOTAL PARKING PROVIDED		
PARKING DECK		UP TO 700 SPACES
ON-SITE PARALLEL PARKING		UP TO 36 SPACES
OFF-SITE PARALLEL SPACES PROPOSED ON HILDERBRAND AVE		UP TO 13 SPACES
OFF-SITE PARALLEL SPACES PROPOSED ON BOYLSTON DR		UP TO 15 SPACES
OFF-SITE PARALLEL SPACES PROPOSED ON PROPOSED NEW STREET		UP TO 43 SPACES
TOTAL		UP TO 857 SPACES
UNIT MIX (% MIX)		
STUDIO		0 - 10 % (550sf - 750sf)
ONE BEDROOM		40 - 50 % (700sf - 950sf)
TWO BEDROOM		40 - 50 % (925sf - 1300sf)
THREE BEDROOM		0 - 10 % (1350sf - 1600sf)
OPEN SPACE CALCULATION - SEE OPEN SPACE EXHIBIT		
LANDSCAPED AREA		0.72 ACRES
HARDSCAPE AREA		0.61 ACRES
TOTAL OPEN SPACE		1.33 ACRES
1.33 AC / 5.11 AC		(26% OF SITE AREA)

SITE NOTES:
1.) TOTAL AREA OF SUBJECT PROPERTY = 5.11 AC
2.) CURRENT ZONING OF SUBJECT SITE IS C-1 COMMUNITY BUSINESS DISTRICT
3.) NO WETLANDS EXIST ON/NEAR THE SUBJECT SITE
4.) PER FIRM MAP 13121C0142F, NO PORTION OF THIS SITE IS LOCATED INSIDE THE 100-YEAR FLOODPLAIN
5.) EXISTING TOPOGRAPHY AND UTILITIES PROVIDED ON ATTACHED BOUNDARY/ALTA SURVEY
6.) PER THE OCTOBER 16, 2014 LETTER FROM LAMAR LAMBERT AT FULTON COUNTY DEPT. OF WATER RESOURCES, SEWAGE TREATMENT CAPACITY IS AVAILABLE FOR THE SUBJECT SITE.
7.) PER THE SEPTEMBER 19, 2014 LETTER FROM RON BROWN AT CITY OF ATLANTA, WATER AVAILABILITY EXISTS FOR THE SUBJECT SITE.



VICINITY MAP
(NOT TO SCALE)



FEMA FLOOD MAP
THIS PROPERTY DOES NOT LIE WITHIN THE 100 YEAR FLOOD PLAIN AS ESTABLISHED BY FEMA FLOOD INSURANCE RATE MAP PANEL NUMBER 13121C 0142F DATED: SEPTEMBER 18, 2013

NORTH

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

CAUTION
THE UTILITIES SHOWN HEREON ARE FOR THE CONTRACTORS CONVENIENCE ONLY. THERE MAY BE OTHER UTILITIES NOT SHOWN ON THESE PLANS. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE LOCATIONS SHOWN AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL UTILITIES WITHIN THE LIMITS OF THE WORK. ALL DAMAGE MADE TO EXISTING UTILITIES BY THE CONTRACTOR SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

811
Know what's below.
Call before you dig.

GEORGIA REGISTERED PROFESSIONAL ENGINEER No. 31979 Christopher K. Harrell
GSSWCC LEVEL I CERT. #0000013977

summit
Engineering Consultants, Inc.
6595 Shiloh Road, Suite 100
Alpharetta, GA 30005
(p) 770-667-0994 (f) 770-667-0095

MCRT Investments, LLC
3715 NORTHSIDE PARKWAY
SUITE 2-725
ATLANTA, GA 30327
OFFICE: 678-608-0907
FAX: 770-552-5784

Revision Schedule

No	Date
1	3/5/15
CITY OF SANDY SPRINGS COMMENTS	

Project No.	S-14-022
Design By:	CKH
Drawn By:	DDG
Checked By:	DDG
Date:	10/29/14
Scale:	1" = 30'

ZONING SITE PLAN
MILL CREEK AT SANDY SPRINGS

Drawing No.
1

S-14-019det.dwg

APPENDIX B

Site Photographs

Kimley»Horn
817 West Peachtree Street, NW
Suite 601
Atlanta, GA, 30308

Mill Creek Residential Trust, LLC

Photograph Sheet

KHA Job No.: 019947004
KHA Rep.: -
Date: February 12, 2015
Page: 1 of 3

Site Name: Mill Creek at Sandy Springs Development

Photo No. 1

Comments: Roswell Road (SR 9) at Hilderbrand Drive, Northbound Approach

Photo No. 2

Comments: Boylston Drive at Hilderbrand Drive, Southbound Approach

Kimley»Horn
817 West Peachtree Street, NW
Suite 601
Atlanta, GA, 30308

Mill Creek Residential Trust, LLC

Photograph Sheet

KHA Job No.: 019947004
KHA Rep.: -
Date: February 12, 2015

Site Name: Mill Creek at Sandy Springs Development

Photo No. 3

Comments: Boylston Drive at New Road, Northbound Approach

Photo No. 4

Comments: Roswell Road (SR 9) at New Road, Southbound Approach

Kimley»Horn
817 West Peachtree Street, NW
Suite 601
Atlanta, GA, 30308

Mill Creek Residential Trust, LLC

Photograph Sheet

KHA Job No.: 019947004
KHA Rep.: -
Date: February 12, 2015

Site Name: Mill Creek at Sandy Springs Development

Photo No. 5

Comments: Roswell Road (SR 9) at Driveway #1, Southbound Approach

Photo No. 6

Comments: Driveway #2 at Hilderbrand Drive, Eastbound Approach

APPENDIX C

Intersection Volume Worksheets

INTERSECTION VOLUME DEVELOPMENT

Roswell Road and Hilderbrand Dr
AM PEAK HOUR

Description	Roswell Road Northbound			Roswell Road Southbound			Hilderbrand Dr Eastbound			Hilderbrand Dr Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	11	852	34	64	1,245	34	12	21	17	36	8	18
Pedestrians		1			3			0			1	
Conflicting Pedestrians	0		1	1		0	3		1	1		3
PHF	0.90	0.92	0.90	0.90	0.96	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	11	886	35	67	1,295	35	12	22	18	37	8	19
Percent Inbound Assignment	0%	0%	10%	18%	7%	0%	0%	5%	0%	0%	0%	0%
Percent Outbound Assignment	0%	20%	0%	0%	0%	0%	0%	0%	0%	35%	5%	5%
Total Project Trips	0	42	9	17	7	0	0	5	0	72	10	11
Redistribution of Existing Traffic	0	0	-10	0	0	0	0	0	0	-10	0	0
2017 Buildout Total	11	928	34	84	1,302	35	12	27	18	99	18	30

PM PEAK HOUR

Description	Roswell Road Northbound			Roswell Road Southbound			Hilderbrand Dr Eastbound			Hilderbrand Dr Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	41	1,465	22	29	1,004	34	35	35	22	63	62	66
Pedestrians		10			5			0			6	
Conflicting Pedestrians	0		6	6		0	5		10	10		5
PHF	0.90	0.96	0.90	0.90	0.96	0.90	0.90	0.90	0.90	0.93	0.90	0.92
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	43	1,524	23	30	1,045	35	36	36	23	66	65	69
Percent Inbound Assignment	0%	0%	10%	18%	7%	0%	0%	5%	0%	0%	0%	0%
Percent Outbound Assignment	0%	20%	0%	0%	0%	0%	0%	0%	0%	35%	5%	5%
Total Project Trips	0	27	20	36	14	0	0	10	0	47	7	6
Pass-By Traffic	0	-7	7	13	-13	0	0	0	0	13	0	7
Redistribution of Existing Traffic	0	0	-10	0	0	0	0	0	0	-10	0	0
2017 Buildout Total	43	1,544	40	79	1,046	35	36	46	23	116	72	82

INTERSECTION VOLUME DEVELOPMENT

Boylston Drive and Hilderbrand Dr
AM PEAK HOUR

Description	Boylston Drive Northbound			Boylston Drive Southbound			Hilderbrand Dr Eastbound			Hilderbrand Dr Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	4	70	5	2	60	33	62	22	23	13	19	6
Pedestrians		0			0			3			1	
Conflicting Pedestrians	3		1	1		3	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.91	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	4	73	5	2	62	34	65	23	24	14	20	6
Percent Inbound Assignment	0%	0%	0%	0%	5%	5%	0%	0%	0%	0%	5%	0%
Percent Outbound Assignment	0%	5%	0%	0%	0%	0%	5%	5%	0%	0%	0%	0%
Total Project Trips	0	10	0	0	5	5	10	11	0	0	4	0
Redistribution of Existing Traffic	0	5	3	0	5	-5	-5	-3	-2	5	-5	0
2017 Buildout Total	4	88	8	2	72	34	70	31	22	19	19	6

PM PEAK HOUR

Description	Boylston Drive Northbound			Boylston Drive Southbound			Hilderbrand Dr Eastbound			Hilderbrand Dr Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	15	76	4	4	86	73	56	17	12	94	144	32
Pedestrians		0			2			4			3	
Conflicting Pedestrians	4		3	3		4	2		0	0		2
PHF	0.90	0.90	1.00	0.90	0.90	0.91	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	16	79	4	4	89	76	58	18	12	98	150	33
Percent Inbound Assignment	0%	0%	0%	0%	5%	5%	0%	0%	0%	0%	5%	0%
Percent Outbound Assignment	0%	5%	0%	0%	0%	0%	5%	5%	0%	0%	0%	0%
Total Project Trips	0	7	0	0	10	10	7	6	0	0	10	0
Pass-By Traffic	0	-1	0	0	-1	1	1	0	0	0	0	0
Redistribution of Existing Traffic	0	5	3	0	5	-5	-5	-3	-2	5	-5	0
2017 Buildout Total	16	90	7	4	103	82	61	21	10	103	155	33

INTERSECTION VOLUME DEVELOPMENT

Roswell Road at New Street
AM PEAK HOUR

Description	Roswell Road Northbound			Roswell Road Southbound			- Eastbound			New Street Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	897	0	0	1,298	0	0	0	0	0	0	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.92	0.90	0.90	0.96	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	933	0	0	1,350	0	0	0	0	0	0	0
Percent Inbound Assignment	0%	30%	20%	7%	0%	0%	0%	0%	0%	0%	0%	0%
Percent Outbound Assignment	0%	0%	0%	0%	35%	0%	0%	0%	0%	15%	0%	5%
Total Project Trips	0	28	18	7	72	0	0	0	0	31	0	10
Redistribution of Existing Traffic	0	-10	10	10	-20	0	0	0	0	10	0	0
2017 Buildout Total	0	951	28	17	1,402	0	0	0	0	41	0	10

PM PEAK HOUR

Description	Roswell Road Northbound			Roswell Road Southbound			- Eastbound			New Street Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	1,528	0	0	1,089	0	0	0	0	0	0	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.96	0.90	0.90	0.96	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	1,590	0	0	1,133	0	0	0	0	0	0	0
Percent Inbound Assignment	0%	30%	20%	7%	0%	0%	0%	0%	0%	0%	0%	0%
Percent Outbound Assignment	0%	0%	0%	0%	35%	0%	0%	0%	0%	15%	0%	5%
Total Project Trips	0	60	41	14	47	0	0	0	0	20	0	7
Pass-By Traffic	0	-11	11	6	-6	0	0	0	0	6	0	11
Redistribution of Existing Traffic	0	-10	10	10	-20	0	0	0	0	10	0	0
2017 Buildout Total	0	1,629	62	30	1,154	0	0	0	0	36	0	18

INTERSECTION VOLUME DEVELOPMENT

Roswell Road at Driveway #1
AM PEAK HOUR

Description	Roswell Road Northbound			Roswell Road Southbound			- Eastbound			Driveway #1 Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	897	0	0	1,298	0	0	0	0	0	0	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.92	0.90	0.90	0.96	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	933	0	0	1,350	0	0	0	0	0	0	0
Percent Inbound Assignment	0%	10%	20%	0%	7%	0%	0%	0%	0%	0%	0%	0%
Percent Outbound Assignment	0%	5%	0%	0%	35%	0%	0%	0%	0%	0%	0%	15%
Total Project Trips	0	19	19	0	79	0	0	0	0	0	0	32
Redistribution of Existing Traffic	0	-10	0	0	-10	0	0	0	0	0	0	0
2017 Buildout Total	0	942	19	0	1,419	0	0	0	0	0	0	32

PM PEAK HOUR

Description	Roswell Road Northbound			Roswell Road Southbound			- Eastbound			Driveway #1 Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	1,528	0	0	1,089	0	0	0	0	0	0	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.96	0.90	0.90	0.96	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	1,590	0	0	1,133	0	0	0	0	0	0	0
Percent Inbound Assignment	0%	10%	20%	0%	7%	0%	0%	0%	0%	0%	0%	0%
Percent Outbound Assignment	0%	5%	0%	0%	35%	0%	0%	0%	0%	0%	0%	15%
Total Project Trips	0	27	40	0	61	0	0	0	0	0	0	20
Pass-By Traffic	0	-11	11	0	0	0	0	0	0	0	0	11
Redistribution of Existing Traffic	0	-10	0	0	-10	0	0	0	0	0	0	0
2017 Buildout Total	0	1,596	51	0	1,184	0	0	0	0	0	0	31

INTERSECTION VOLUME DEVELOPMENT

Driveway #2 at Hilderbrand Dr
AM PEAK HOUR

Description	Driveway #2 Northbound			- Southbound			Hilderbrand Dr Eastbound			Hilderbrand Dr Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	0	0	0	0	0	0	119	0	0	62	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	0	0	0	0	0	0	124	0	0	65	0
Percent Inbound Assignment	0%	0%	0%	0%	0%	0%	0%	0%	33%	10%	0%	0%
Percent Outbound Assignment	45%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total Project Trips	93	0	21	0	0	0	0	0	31	9	0	0
Redistribution of Existing Traffic	0	0	0	0	0	0	0	-10	0	0	-10	0
2017 Buildout Total	93	0	21	0	0	0	0	114	31	9	55	0

PM PEAK HOUR

Description	Driveway #2 Northbound			- Southbound			Hilderbrand Dr Eastbound			Hilderbrand Dr Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	0	0	0	0	0	0	86	0	0	191	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	0	0	0	0	0	0	89	0	0	199	0
Percent Inbound Assignment	0%	0%	0%	0%	0%	0%	0%	0%	33%	10%	0%	0%
Percent Outbound Assignment	45%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total Project Trips	60	0	13	0	0	0	0	0	66	20	0	0
Pass-By Traffic	25	0	1	0	0	0	0	-2	22	6	-5	0
Redistribution of Existing Traffic	0	0	0	0	0	0	0	-10	0	0	-10	0
2017 Buildout Total	85	0	14	0	0	0	0	77	88	26	184	0

INTERSECTION VOLUME DEVELOPMENT

Boylston Drive at New Street
AM PEAK HOUR

Description	Boylston Drive Northbound			Boylston Drive Southbound			New Street Eastbound			- Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	79	0	0	96	0	0	0	0	0	0	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.92	0.90	0.90	0.96	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	82	0	0	100	0	0	0	0	0	0	0
Percent Inbound Assignment	5%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
Percent Outbound Assignment	0%	0%	0%	0%	0%	5%	0%	0%	5%	0%	0%	0%
Total Project Trips	4	0	0	0	0	10	5	0	10	0	0	0
Redistribution of Existing Traffic	0	0	0	0	-2	10	8	0	12	0	0	0
2017 Buildout Total	4	82	0	0	98	20	13	0	22	0	0	0

PM PEAK HOUR

Description	Boylston Drive Northbound			Boylston Drive Southbound			New Street Eastbound			- Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	95	0	0	192	0	0	0	0	0	0	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.96	0.90	0.90	0.96	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	99	0	0	200	0	0	0	0	0	0	0
Percent Inbound Assignment	5%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
Percent Outbound Assignment	0%	0%	0%	0%	0%	5%	0%	0%	5%	0%	0%	0%
Total Project Trips	10	0	0	0	0	7	10	0	6	0	0	0
Pass-By Traffic	1	-1	0	0	-1	0	2	0	1	0	0	0
Redistribution of Existing Traffic	0	0	0	0	-2	10	8	0	12	0	0	0
2017 Buildout Total	11	98	0	0	197	17	20	0	19	0	0	0

INTERSECTION VOLUME DEVELOPMENT

Driveway #3 at New Street
AM PEAK HOUR

Description	Driveway #3 Northbound			- Southbound			New Street Eastbound			New Street Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	0	0	0	0	0	0	0	0	0	0	0
Percent Inbound Assignment	0%	0%	0%	0%	0%	0%	22%	5%	0%	0%	0%	5%
Percent Outbound Assignment	0%	0%	0%	5%	0%	15%	0%	0%	0%	0%	5%	0%
Total Project Trips	0	0	0	9	0	31	20	5	0	0	10	5
Redistribution of Existing Traffic	0	0	0	0	0	0	0	20	0	0	10	0
2017 Buildout Total	0	0	0	9	0	31	20	25	0	0	20	5

PM PEAK HOUR

Description	Driveway #3 Northbound			- Southbound			New Street Eastbound			New Street Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	0	0	0	0	0	0	0	0	0	0	0
Percent Inbound Assignment	0%	0%	0%	0%	0%	0%	22%	5%	0%	0%	0%	5%
Percent Outbound Assignment	0%	0%	0%	5%	0%	15%	0%	0%	0%	0%	5%	0%
Total Project Trips	0	0	0	7	0	20	45	10	0	0	7	10
Pass-By Traffic	0	0	0	3	0	17	17	0	0	0	0	1
Redistribution of Existing Traffic	0	0	0	0	0	0	0	20	0	0	10	0
2017 Buildout Total	0	0	0	10	0	37	62	30	0	0	17	11

INTERSECTION VOLUME DEVELOPMENT

Driveway #4 at Boylston Drive
AM PEAK HOUR

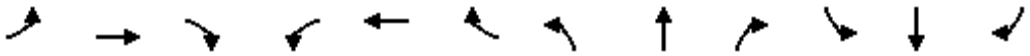
Description	Driveway #3 Northbound			- Southbound			New Street Eastbound			New Street Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	79	0	0	96	0	0	0	0	0	0	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	82	0	0	100	0	0	0	0	0	0	0
Percent Inbound Assignment	5%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
Percent Outbound Assignment	0%	0%	0%	0%	0%	0%	5%	0%	5%	0%	0%	0%
Total Project Trips	5	0	0	0	0	5	10	0	10	0	0	0
Redistribution of Existing Traffic	0	8	0	0	8	0	0	0	0	0	0	0
2017 Buildout Total	5	90	0	0	108	5	10	0	10	0	0	0

PM PEAK HOUR

Description	Driveway #3 Northbound			- Southbound			New Street Eastbound			New Street Westbound		
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
2015 Existing Traffic	0	95	0	0	192	0	0	0	0	0	0	0
Pedestrians		0			0			0			0	
Conflicting Pedestrians	0		0	0		0	0		0	0		0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicle %	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Annual Growth Rate	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
2017 No-Build Traffic	0	99	0	0	200	0	0	0	0	0	0	0
Percent Inbound Assignment	5%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
Percent Outbound Assignment	0%	0%	0%	0%	0%	0%	5%	0%	5%	0%	0%	0%
Total Project Trips	10	0	0	0	0	10	7	0	7	0	0	0
Pass-By Traffic	1	-2	0	0	-2	2	1	0	2	0	0	0
Redistribution of Existing Traffic	0	8	0	0	8	0	0	0	0	0	0	0
2017 Buildout Total	11	105	0	0	206	12	8	0	9	0	0	0

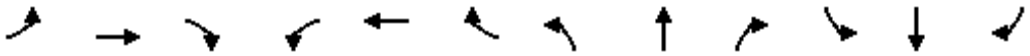
APPENDIX D

Synchro Analysis Reports



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	21	17	36	8	18	11	852	34	64	1245	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.96		1.00	0.99		1.00	1.00	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1744			1728		1770	3374		1769	3383	
Flt Permitted		0.89			0.79		0.19	1.00		0.28	1.00	
Satd. Flow (perm)		1577			1401		352	3374		519	3383	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.90	0.90	0.96	0.90
Adj. Flow (vph)	13	23	19	40	9	20	12	926	38	71	1297	38
RTOR Reduction (vph)	0	11	0	0	8	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	44	0	0	61	0	12	963	0	71	1334	0
Confl. Peds. (#/hr)	3		1	1		3			1	1		
Bus Blockages (#/hr)	0	0	0	0	0	0	0	20	20	0	20	20
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.1			11.1		148.6	147.0		153.4	149.3	
Effective Green, g (s)		11.1			11.1		148.6	147.0		153.4	149.3	
Actuated g/C Ratio		0.06			0.06		0.83	0.82		0.85	0.83	
Clearance Time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Vehicle Extension (s)		0.2			0.2		0.2	3.0		0.2	3.0	
Lane Grp Cap (vph)		97			86		303	2755		470	2806	
v/s Ratio Prot							0.00	0.29		c0.00	c0.39	
v/s Ratio Perm		0.03			c0.04		0.03			0.13		
v/c Ratio		0.45			0.70		0.04	0.35		0.15	0.48	
Uniform Delay, d1		81.5			82.8		3.1	4.2		2.3	4.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.2			19.2		0.0	0.4		0.1	0.6	
Delay (s)		82.7			102.0		3.2	4.6		2.4	4.9	
Level of Service		F			F		A	A		A	A	
Approach Delay (s)		82.7			102.0			4.6			4.8	
Approach LOS		F			F			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



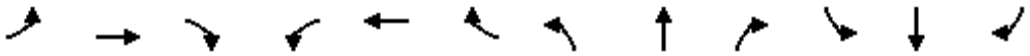
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	62	22	23	13	19	6	4	70	5	2	60	33
Peak Hour Factor	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	24	26	14	21	7	4	78	6	2	67	37

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	118	42	88	106
Volume Left (vph)	68	14	4	2
Volume Right (vph)	26	7	6	37
Hadj (s)	0.02	0.01	0.01	-0.17
Departure Headway (s)	4.4	4.5	4.4	4.2
Degree Utilization, x	0.14	0.05	0.11	0.12
Capacity (veh/h)	781	753	780	810
Control Delay (s)	8.1	7.7	7.9	7.8
Approach Delay (s)	8.1	7.7	7.9	7.8
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	23.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	35	22	63	62	66	41	1465	22	29	1004	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Frt		0.97			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1751			1723		1770	3387		1770	3380	
Flt Permitted		0.72			0.83		0.22	1.00		0.11	1.00	
Satd. Flow (perm)		1292			1454		407	3387		205	3380	
Peak-hour factor, PHF	0.90	0.90	0.90	0.93	0.90	0.92	0.90	0.96	0.90	0.90	0.96	0.90
Adj. Flow (vph)	39	39	24	68	69	72	46	1526	24	32	1046	38
RTOR Reduction (vph)	0	6	0	0	10	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	96	0	0	199	0	46	1549	0	32	1082	0
Confl. Peds. (#/hr)	5		10	10		5			6	6		
Bus Blockages (#/hr)	0	0	0	0	0	0	0	20	20	0	20	20
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		35.6			35.6		126.8	123.3		126.2	122.9	
Effective Green, g (s)		35.6			35.6		126.8	123.3		126.2	122.9	
Actuated g/C Ratio		0.20			0.20		0.70	0.68		0.70	0.68	
Clearance Time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Vehicle Extension (s)		0.2			0.2		0.2	3.0		0.2	3.0	
Lane Grp Cap (vph)		255			287		313	2320		172	2307	
v/s Ratio Prot							0.00	c0.46		c0.00	0.32	
v/s Ratio Perm		0.07			c0.14		0.10			0.13		
v/c Ratio		0.38			0.69		0.15	0.67		0.19	0.47	
Uniform Delay, d1		62.6			67.1		9.4	16.5		13.3	13.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			5.8		0.1	1.5		0.2	0.7	
Delay (s)		62.9			72.9		9.5	18.0		13.5	14.0	
Level of Service		E			E		A	B		B	B	
Approach Delay (s)		62.9			72.9			17.8			14.0	
Approach LOS		E			E			B			B	

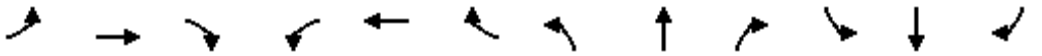
Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	56	17	12	94	144	32	15	76	4	4	86	73
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	1.00	0.90	0.90	0.91
Hourly flow rate (vph)	62	19	13	104	160	36	17	84	4	4	96	80

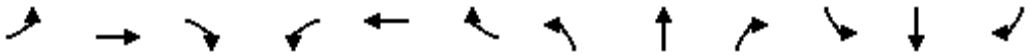
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	94	300	105	180
Volume Left (vph)	62	104	17	4
Volume Right (vph)	13	36	4	80
Hadj (s)	0.08	0.03	0.04	-0.23
Departure Headway (s)	5.1	4.8	5.2	4.8
Degree Utilization, x	0.13	0.40	0.15	0.24
Capacity (veh/h)	641	711	631	684
Control Delay (s)	8.9	11.0	9.1	9.4
Approach Delay (s)	8.9	11.0	9.1	9.4
Approach LOS	A	B	A	A

Intersection Summary				
Delay	10.0			
Level of Service	A			
Intersection Capacity Utilization	33.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	22	18	37	8	19	11	886	35	67	1295	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.96		1.00	0.99		1.00	1.00	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1743			1726		1770	3374		1769	3383	
Flt Permitted		0.89			0.78		0.18	1.00		0.27	1.00	
Satd. Flow (perm)		1577			1380		330	3374		496	3383	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.90	0.90	0.96	0.90
Adj. Flow (vph)	13	24	20	41	9	21	12	963	39	74	1349	39
RTOR Reduction (vph)	0	12	0	0	9	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	45	0	0	62	0	12	1001	0	74	1387	0
Confl. Peds. (#/hr)	3		1	1		3			1	1		
Bus Blockages (#/hr)	0	0	0	0	0	0	0	20	20	0	20	20
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.2			11.2		148.4	146.8		153.4	149.2	
Effective Green, g (s)		11.2			11.2		148.4	146.8		153.4	149.2	
Actuated g/C Ratio		0.06			0.06		0.82	0.82		0.85	0.83	
Clearance Time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Vehicle Extension (s)		0.2			0.2		0.2	3.0		0.2	3.0	
Lane Grp Cap (vph)		98			85		284	2751		452	2804	
v/s Ratio Prot							0.00	0.30		c0.00	c0.41	
v/s Ratio Perm		0.03			c0.04		0.03			0.14		
v/c Ratio		0.46			0.72		0.04	0.36		0.16	0.49	
Uniform Delay, d1		81.5			82.9		3.3	4.4		2.4	4.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.2			22.6		0.0	0.4		0.1	0.6	
Delay (s)		82.7			105.5		3.3	4.7		2.5	5.1	
Level of Service		F			F		A	A		A	A	
Approach Delay (s)		82.7			105.5			4.7			5.0	
Approach LOS		F			F			A			A	

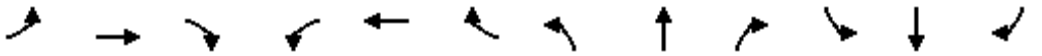
Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	65	23	24	14	20	6	4	73	5	2	62	34
Peak Hour Factor	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	71	26	27	16	22	7	4	81	6	2	69	38

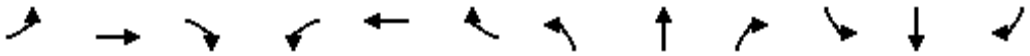
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	124	44	91	109
Volume Left (vph)	71	16	4	2
Volume Right (vph)	27	7	6	38
Hadj (s)	0.02	0.01	0.01	-0.17
Departure Headway (s)	4.4	4.5	4.4	4.2
Degree Utilization, x	0.15	0.06	0.11	0.13
Capacity (veh/h)	777	746	774	805
Control Delay (s)	8.2	7.8	8.0	7.8
Approach Delay (s)	8.2	7.8	8.0	7.8
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.0			
Level of Service	A			
Intersection Capacity Utilization	23.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	36	23	66	65	69	43	1524	23	30	1045	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Frt		0.97			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1748			1723		1770	3386		1770	3380	
Flt Permitted		0.72			0.83		0.21	1.00		0.10	1.00	
Satd. Flow (perm)		1277			1446		384	3386		184	3380	
Peak-hour factor, PHF	0.90	0.90	0.90	0.93	0.90	0.92	0.90	0.96	0.90	0.90	0.96	0.90
Adj. Flow (vph)	40	40	26	71	72	75	48	1588	26	33	1089	39
RTOR Reduction (vph)	0	6	0	0	10	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	100	0	0	208	0	48	1613	0	33	1126	0
Confl. Peds. (#/hr)	5		10	10		5			6	6		
Bus Blockages (#/hr)	0	0	0	0	0	0	0	20	20	0	20	20
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		35.7			35.7		126.7	123.3		126.1	122.9	
Effective Green, g (s)		35.7			35.7		126.7	123.3		126.1	122.9	
Actuated g/C Ratio		0.20			0.20		0.70	0.68		0.70	0.68	
Clearance Time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Vehicle Extension (s)		0.2			0.2		0.2	3.0		0.2	3.0	
Lane Grp Cap (vph)		253			286		296	2319		157	2307	
v/s Ratio Prot							0.00	c0.48		c0.00	0.33	
v/s Ratio Perm		0.08			c0.14		0.11			0.14		
v/c Ratio		0.40			0.73		0.16	0.70		0.21	0.49	
Uniform Delay, d1		62.8			67.6		9.7	17.1		14.4	13.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			7.6		0.1	1.8		0.2	0.7	
Delay (s)		63.2			75.2		9.8	18.8		14.6	14.3	
Level of Service		E			E		A	B		B	B	
Approach Delay (s)		63.2			75.2			18.6			14.3	
Approach LOS		E			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



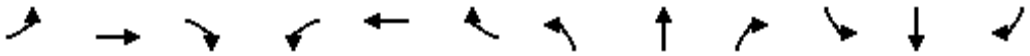
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	58	18	12	98	150	33	16	79	4	4	89	76
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	1.00	0.90	0.90	0.91
Hourly flow rate (vph)	64	20	13	109	167	37	18	88	4	4	99	84

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	98	312	110	187
Volume Left (vph)	64	109	18	4
Volume Right (vph)	13	37	4	84
Hadj (s)	0.08	0.03	0.04	-0.23
Departure Headway (s)	5.2	4.8	5.3	4.9
Degree Utilization, x	0.14	0.42	0.16	0.25
Capacity (veh/h)	632	704	621	675
Control Delay (s)	9.0	11.3	9.3	9.5
Approach Delay (s)	9.0	11.3	9.3	9.5
Approach LOS	A	B	A	A

Intersection Summary				
Delay	10.2			
Level of Service	B			
Intersection Capacity Utilization	35.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	27	18	99	18	30	11	928	34	84	1302	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.96			0.97		1.00	0.99		1.00	1.00	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1755			1743		1770	3376		1770	3383	
Flt Permitted		0.92			0.75		0.16	1.00		0.24	1.00	
Satd. Flow (perm)		1634			1361		301	3376		441	3383	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.90	0.90	0.96	0.90
Adj. Flow (vph)	13	30	20	110	20	33	12	1009	38	93	1356	39
RTOR Reduction (vph)	0	9	0	0	5	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	54	0	0	158	0	12	1046	0	93	1394	0
Confl. Peds. (#/hr)	3		1	1		3			1	1		
Bus Blockages (#/hr)	0	0	0	0	0	0	0	20	20	0	20	20
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		24.7			24.7		134.1	132.5		140.7	135.7	
Effective Green, g (s)		24.7			24.7		134.1	132.5		140.7	135.7	
Actuated g/C Ratio		0.14			0.14		0.74	0.74		0.78	0.75	
Clearance Time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Vehicle Extension (s)		0.2			0.2		0.2	3.0		0.2	3.0	
Lane Grp Cap (vph)		224			186		237	2485		381	2550	
v/s Ratio Prot							0.00	0.31		c0.01	c0.41	
v/s Ratio Perm		0.03			c0.12		0.04			0.18		
v/c Ratio		0.24			0.85		0.05	0.42		0.24	0.55	
Uniform Delay, d1		69.3			75.8		7.2	9.1		5.7	9.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			27.5		0.0	0.5		0.1	0.8	
Delay (s)		69.5			103.3		7.2	9.6		5.8	10.1	
Level of Service		E			F		A	A		A	B	
Approach Delay (s)		69.5			103.3			9.6			9.8	
Approach LOS		E			F			A			A	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	70	31	22	19	19	6	4	88	8	2	72	34
Peak Hour Factor	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	77	34	24	21	21	7	4	98	9	2	80	38

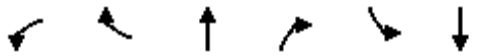
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	136	49	111	120
Volume Left (vph)	77	21	4	2
Volume Right (vph)	24	7	9	38
Hadj (s)	0.04	0.04	-0.01	-0.15
Departure Headway (s)	4.5	4.6	4.5	4.3
Degree Utilization, x	0.17	0.06	0.14	0.14
Capacity (veh/h)	746	722	764	785
Control Delay (s)	8.5	7.9	8.2	8.0
Approach Delay (s)	8.5	7.9	8.2	8.0
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.2		
Level of Service	A		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	41	10	951	28	17	1402
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.92	0.90	0.90	0.96
Hourly flow rate (vph)	46	11	1034	31	19	1460
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						490
pX, platoon unblocked	0.83					
vC, conflicting volume	1817	532			1065	
vC1, stage 1 conf vol	1049					
vC2, stage 2 conf vol	768					
vCu, unblocked vol	1568	532			1065	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	98			97	
cM capacity (veh/h)	267	492			650	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	57	689	376	19	730	730
Volume Left	46	0	0	19	0	0
Volume Right	11	0	31	0	0	0
cSH	293	1700	1700	650	1700	1700
Volume to Capacity	0.19	0.41	0.22	0.03	0.43	0.43
Queue Length 95th (ft)	18	0	0	2	0	0
Control Delay (s)	20.2	0.0	0.0	10.7	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	20.2	0.0		0.1		
Approach LOS	C					

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	32	942	19	0	1419
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.92	0.90	0.90	0.96
Hourly flow rate (vph)	0	36	1024	21	0	1478
Pedestrians	19		79			32
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	2		7			3
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						260
pX, platoon unblocked	0.83					
vC, conflicting volume	1872	574			1064	
vC1, stage 1 conf vol	1053					
vC2, stage 2 conf vol	818					
vCu, unblocked vol	1634	574			1064	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	92			100	
cM capacity (veh/h)	255	443			640	

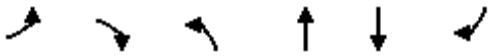
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	36	683	362	739	739
Volume Left	0	0	0	0	0
Volume Right	36	0	21	0	0
cSH	443	1700	1700	1700	1700
Volume to Capacity	0.08	0.40	0.21	0.43	0.43
Queue Length 95th (ft)	7	0	0	0	0
Control Delay (s)	13.8	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	13.8	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	114	31	9	55	93	21
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	127	34	10	61	103	23
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	305					
pX, platoon unblocked			1.00		1.00	1.00
vC, conflicting volume			161		225	144
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			157		221	140
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		86	97
cM capacity (veh/h)			1418		759	906

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	161	71	127
Volume Left	0	10	103
Volume Right	34	0	23
cSH	1700	1418	783
Volume to Capacity	0.09	0.01	0.16
Queue Length 95th (ft)	0	1	14
Control Delay (s)	0.0	1.1	10.5
Lane LOS		A	B
Approach Delay (s)	0.0	1.1	10.5
Approach LOS			B

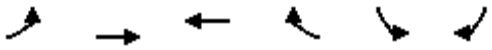
Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	23.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	13	22	4	82	98	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.92	0.96	0.90
Hourly flow rate (vph)	14	24	4	89	102	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	211	113	124			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	211	113	124			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	100			
cM capacity (veh/h)	775	940	1462			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	39	94	124
Volume Left	14	4	0
Volume Right	24	0	22
cSH	871	1462	1700
Volume to Capacity	0.04	0.00	0.07
Queue Length 95th (ft)	4	0	0
Control Delay (s)	9.3	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.3	0.4	0.0
Approach LOS	A		

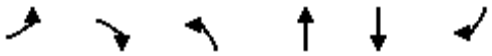
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	20	25	20	5	9	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	22	28	22	6	10	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	28				97	25
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	28				97	25
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	97
cM capacity (veh/h)	1586				889	1051

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	50	28	44
Volume Left	22	0	10
Volume Right	0	6	34
cSH	1586	1700	1010
Volume to Capacity	0.01	0.02	0.04
Queue Length 95th (ft)	1	0	3
Control Delay (s)	3.3	0.0	8.7
Lane LOS	A		A
Approach Delay (s)	3.3	0.0	8.7
Approach LOS			A

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



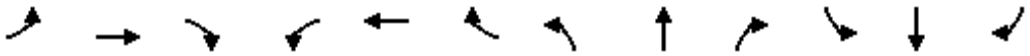
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	10	5	90	108	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	11	6	100	120	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	234	123	126			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234	123	126			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	751	928	1461			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	22	106	126
Volume Left	11	6	0
Volume Right	11	0	6
cSH	831	1461	1700
Volume to Capacity	0.03	0.00	0.07
Queue Length 95th (ft)	2	0	0
Control Delay (s)	9.5	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.5	0.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	18.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	46	23	116	72	82	43	1544	40	79	1046	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Frt		0.97			0.96		1.00	1.00		1.00	0.99	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1762			1724		1770	3379		1770	3380	
Flt Permitted		0.72			0.76		0.21	1.00		0.10	1.00	
Satd. Flow (perm)		1286			1330		400	3379		178	3380	
Peak-hour factor, PHF	0.90	0.90	0.90	0.93	0.90	0.92	0.90	0.96	0.90	0.90	0.96	0.90
Adj. Flow (vph)	40	51	26	125	80	89	48	1608	44	88	1090	39
RTOR Reduction (vph)	0	6	0	0	8	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	111	0	0	286	0	48	1651	0	88	1128	0
Confl. Peds. (#/hr)	5		10	10		5			6	6		
Bus Blockages (#/hr)	0	0	0	0	0	0	0	20	20	0	20	20
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		31.2			31.2		129.6	126.3		132.2	127.5	
Effective Green, g (s)		31.2			31.2		129.6	126.3		132.2	127.5	
Actuated g/C Ratio		0.17			0.17		0.72	0.70		0.73	0.71	
Clearance Time (s)		6.8			6.8		5.3	5.9		5.1	5.9	
Vehicle Extension (s)		0.2			0.2		0.2	3.0		0.2	3.0	
Lane Grp Cap (vph)		222			230		313	2370		172	2394	
v/s Ratio Prot							0.00	c0.49		c0.01	0.33	
v/s Ratio Perm		0.09			c0.21		0.11			0.36		
v/c Ratio		0.50			1.24		0.15	0.70		0.51	0.47	
Uniform Delay, d1		67.4			74.4		8.3	15.7		15.1	11.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6			140.2		0.1	1.7		1.1	0.7	
Delay (s)		68.0			214.6		8.4	17.4		16.2	12.2	
Level of Service		E			F		A	B		B	B	
Approach Delay (s)		68.0			214.6			17.1			12.4	
Approach LOS		E			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	61	21	10	103	155	33	16	90	7	4	103	82
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	1.00	0.90	0.90	0.91
Hourly flow rate (vph)	68	23	11	114	172	37	18	100	7	4	114	90

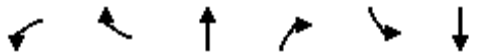
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	102	323	125	209
Volume Left (vph)	68	114	18	4
Volume Right (vph)	11	37	7	90
Hadj (s)	0.10	0.04	0.03	-0.22
Departure Headway (s)	5.4	5.0	5.4	5.0
Degree Utilization, x	0.15	0.45	0.19	0.29
Capacity (veh/h)	607	685	608	661
Control Delay (s)	9.3	12.0	9.6	10.0
Approach Delay (s)	9.3	12.0	9.6	10.0
Approach LOS	A	B	A	B

Intersection Summary			
Delay	10.7		
Level of Service	B		
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	36	18	1629	62	30	1154
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.96	0.90	0.90	0.96
Hourly flow rate (vph)	40	20	1697	69	33	1202
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						490
pX, platoon unblocked	0.86					
vC, conflicting volume	2399	883			1766	
vC1, stage 1 conf vol	1731					
vC2, stage 2 conf vol	668					
vCu, unblocked vol	2299	883			1766	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	67	93			90	
cM capacity (veh/h)	122	289			349	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	60	1131	635	33	601	601
Volume Left	40	0	0	33	0	0
Volume Right	20	0	69	0	0	0
cSH	151	1700	1700	349	1700	1700
Volume to Capacity	0.40	0.67	0.37	0.10	0.35	0.35
Queue Length 95th (ft)	43	0	0	8	0	0
Control Delay (s)	43.7	0.0	0.0	16.4	0.0	0.0
Lane LOS	E			C		
Approach Delay (s)	43.7	0.0		0.4		
Approach LOS	E					

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	31	1596	51	0	1184
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.96	0.90	0.90	0.96
Hourly flow rate (vph)	0	34	1662	57	0	1233
Pedestrians	40		61			27
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	3		5			2
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (ft)						270
pX, platoon unblocked	0.85					
vC, conflicting volume	2408	927			1759	
vC1, stage 1 conf vol	1731					
vC2, stage 2 conf vol	678					
vCu, unblocked vol	2308	927			1759	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	87			100	
cM capacity (veh/h)	118	255			340	

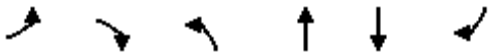
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	34	1108	611	617	617
Volume Left	0	0	0	0	0
Volume Right	34	0	57	0	0
cSH	255	1700	1700	1700	1700
Volume to Capacity	0.13	0.65	0.36	0.36	0.36
Queue Length 95th (ft)	12	0	0	0	0
Control Delay (s)	21.3	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s)	21.3	0.0		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	77	88	26	184	85	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	86	98	29	204	94	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	315					
pX, platoon unblocked			0.99		0.99	0.99
vC, conflicting volume			183		397	134
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			176		391	127
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		84	98
cM capacity (veh/h)			1392		597	918

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	183	233	110
Volume Left	0	29	94
Volume Right	98	0	16
cSH	1700	1392	628
Volume to Capacity	0.11	0.02	0.18
Queue Length 95th (ft)	0	2	16
Control Delay (s)	0.0	1.1	11.9
Lane LOS		A	B
Approach Delay (s)	0.0	1.1	11.9
Approach LOS			B

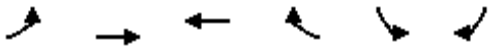
Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	20	19	11	98	197	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.96	0.96	0.90
Hourly flow rate (vph)	22	21	12	102	205	19
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	341	215	224			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	341	215	224			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	97	99			
cM capacity (veh/h)	649	825	1345			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	114	224
Volume Left	22	12	0
Volume Right	21	0	19
cSH	724	1345	1700
Volume to Capacity	0.06	0.01	0.13
Queue Length 95th (ft)	5	1	0
Control Delay (s)	10.3	0.9	0.0
Lane LOS	B	A	
Approach Delay (s)	10.3	0.9	0.0
Approach LOS	B		

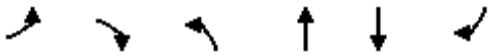
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	62	30	17	11	10	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	69	33	19	12	11	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	31				196	25
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	31				196	25
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				99	96
cM capacity (veh/h)	1581				758	1051

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	102	31	52
Volume Left	69	0	11
Volume Right	0	12	41
cSH	1581	1700	971
Volume to Capacity	0.04	0.02	0.05
Queue Length 95th (ft)	3	0	4
Control Delay (s)	5.1	0.0	8.9
Lane LOS	A		A
Approach Delay (s)	5.1	0.0	8.9
Approach LOS			A

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	8	9	11	105	206	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	10	12	117	229	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	377	236	242			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	377	236	242			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	619	803	1324			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	19	129	242
Volume Left	9	12	0
Volume Right	10	0	13
cSH	705	1324	1700
Volume to Capacity	0.03	0.01	0.14
Queue Length 95th (ft)	2	1	0
Control Delay (s)	10.2	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	10.2	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX E

Raw Traffic Counts

Project ID: 15-9029-001
Location: Roswell Rd & Hilderbrand Dr
City: Sandy Springs

Day: Wednesday
Date: 1/28/2015

Peak Start Times	
AM	7:00 AM
MD	12:00 AM
PM	4:00 PM

Groups Printed - Cars, PU, Vans - Heavy Trucks

	Roswell Rd Northbound					Roswell Rd Southbound					Hilderbrand Dr Eastbound					Hilderbrand Dr Westbound					
Start Time	Left	Thru	Rgt	Peds	App. Total	Left	Thru	Rgt	Peds	App. Total	Left	Thru	Rgt	Peds	App. Total	Left	Thru	Rgt	Peds	App. Total	Int. Total
7:00 AM	4	140	8	0	152	6	224	5	1	235	2	1	1	0	4	3	2	2	0	7	398
7:15 AM	2	210	12	1	224	8	281	5	1	294	2	2	3	1	7	7	1	4	0	12	537
7:30 AM	4	208	14	0	226	20	313	8	0	341	2	1	6	0	9	8	1	5	0	14	590
7:45 AM	4	232	9	1	245	16	324	4	0	344	1	9	2	0	12	6	3	6	0	15	616
Total	14	790	43	2	847	50	1142	22	2	1214	7	13	12	1	32	24	7	17	0	48	2141
8:00 AM	1	200	3	0	204	15	291	12	1	318	2	4	4	0	10	12	2	3	0	17	549
8:15 AM	2	212	8	2	222	13	317	10	0	340	7	7	5	1	19	10	2	4	0	16	597
8:30 AM	3	189	8	0	200	14	321	4	2	339	2	5	4	1	11	13	7	4	1	24	574
8:45 AM	0	197	7	4	204	13	327	5	4	345	4	7	2	1	13	7	3	5	1	15	577
Total	6	798	26	6	830	55	1256	31	7	1342	15	23	15	3	53	42	14	16	2	72	2297
BREAK																					
4:00 PM	10	300	5	4	315	10	227	11	2	248	10	5	8	2	23	18	14	15	4	47	633
4:15 PM	2	329	3	2	334	6	255	9	2	270	2	10	2	2	14	16	12	10	0	38	656
4:30 PM	5	317	3	4	325	5	207	8	4	220	7	5	4	1	16	17	24	12	0	53	614
4:45 PM	8	358	5	1	371	7	234	13	2	254	9	6	3	1	18	16	11	18	0	45	688
Total	25	1304	16	11	1345	28	923	41	10	992	28	26	17	6	71	67	61	55	4	183	2591
5:00 PM	12	350	6	2	368	5	262	3	5	270	11	12	8	3	31	14	16	17	0	47	716
5:15 PM	10	375	7	1	392	6	254	7	1	267	8	8	5	2	21	17	17	14	0	48	728
5:30 PM	11	382	4	1	397	11	254	11	2	276	7	9	6	0	22	16	18	17	0	51	746
5:45 PM	8	342	6	7	356	11	244	3	3	258	6	8	10	1	24	15	21	13	0	49	687
Total	41	1449	23	11	1513	33	1014	24	11	1071	32	37	29	6	98	62	72	61	0	195	2877
Grand Total	86	4341	108	30	4535	166	4335	118	30	4619	82	99	73	16	254	195	154	149	6	498	9906
Apprch %	1.9	95.7	2.4	0.7		3.6	93.9	2.6	0.6		32.3	39.0	28.7	6.3		39.2	30.9	29.9	1.2		
Total %	0.9	43.8	1.1	0.3	45.8	1.7	43.8	1.2	0.3	46.6	0.8	1.0	0.7	0.2	2.6	2.0	1.6	1.5	0.1	5.0	
Cars, PU, Vans	86	4326	108	30	4520	166	4320	118	30	4604	82	98	73	16	253	195	154	149	6	498	9875
% Cars, PU, Vans	####	99.7	####	100.0	99.7	####	99.7	100.0	####	99.7	####	99.0	####	####	99.6	100.0	100.0	####	####	100.0	99.7
Heavy Trucks	0	15	0		15	0	15	0		15	0	1	0		1	0	0	0		0	31
%Heavy Trucks	0.0	0.3	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.3	0.0	1.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.3

Project ID: 15-9029-001
Location: Roswell Rd & Hilderbrar
City: Sandy Springs

PEAK HOURS

Day: Wednesday
Date: 1/28/2015

AM

	Roswell Rd Northbound				Roswell Rd Southbound				Hilderbrand Dr Eastbound				Hilderbrand Dr Westbound				
Start Time	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM to 09:00 AM																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
7:30 AM	4	208	14	226	20	313	8	341	2	1	6	9	8	1	5	14	590
7:45 AM	4	232	9	245	16	324	4	344	1	9	2	12	6	3	6	15	616
8:00 AM	1	200	3	204	15	291	12	318	2	4	4	10	12	2	3	17	549
8:15 AM	2	212	8	222	13	317	10	340	7	7	5	19	10	2	4	16	597
Total Volume	11	852	34	897	64	1245	34	1343	12	21	17	50	36	8	18	62	2352
% App. Total	1.2	95.0	3.8	100	4.8	92.7	2.5	100	24.0	42.0	34.0	100	58.1	12.9	29.0	100	
PHF				0.915				0.976				0.658				0.912	
Cars, PU, Vans	11	847	34	892	64	1238	34	1336	12	21	17	50	36	8	18	62	2340
% Cars, PU, Vans	####	99.4	####	99.4	100.0	99.4	####	99.5	####	100.0	####	100.0	####	####	100.0	100.0	99.5
Heavy Trucks	0	5	0	5	0	7	0	7	0	0	0	0	0	0	0	0	12
%Heavy Trucks	0.0	0.6	0.0	0.6	0.0	0.6	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5

PM

	Roswell Rd Northbound				Roswell Rd Southbound				Hilderbrand Dr Eastbound				Hilderbrand Dr Westbound				
Start Time	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Int. Total
Peak Hour Analysis from 04:00 PM to 06:00 PM																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
4:45 PM	8	358	5	371	7	234	13	254	9	6	3	18	16	11	18	45	688
5:00 PM	12	350	6	368	5	262	3	270	11	12	8	31	14	16	17	47	716
5:15 PM	10	375	7	392	6	254	7	267	8	8	5	21	17	17	14	48	728
5:30 PM	11	382	4	397	11	254	11	276	7	9	6	22	16	18	17	51	746
Total Volume	41	1465	22	1528	29	1004	34	1067	35	35	22	92	63	62	66	191	2878
% App. Total	2.7	95.9	1.4	100	2.7	94.1	3.2	100	38.0	38.0	23.9	100	33.0	32.5	34.6	100	
PHF				0.962				0.966				0.742				0.936	
Cars, PU, Vans	41	1461	22	1524	29	1003	34	1066	35	35	22	92	63	62	66	191	2873
% Cars, PU, Vans	####	99.7	####	99.7	100.0	99.9	####	99.9	####	100.0	####	100.0	####	####	100.0	100.0	99.8
Heavy Trucks	0	4	0	4	0	1	0	1	0	0	0	0	0	0	0	0	5
%Heavy Trucks	0.0	0.3	0.0	0.3	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

Project ID: 15-9029-002
Location: Boylston Dr & Hilderbrand Dr
City: Sandy Springs

Day: Wednesday
Date: 1/28/2015

Peak Start Times	
AM	7:00 AM
MD	12:00 AM
PM	4:00 PM

Groups Printed - Cars, PU, Vans - Heavy Trucks

	Boylston Dr Northbound					Boylston Dr Southbound					Hilderbrand Dr Eastbound					Hilderbrand Dr Westbound					
Start Time	Left	Thru	Rgt	Peds	App. Total	Left	Thru	Rgt	Peds	App. Total	Left	Thru	Rgt	Peds	App. Total	Left	Thru	Rgt	Peds	App. Total	Int. Total
7:00 AM	2	6	1	0	9	0	6	1	0	7	8	2	1	0	11	3	2	0	0	5	32
7:15 AM	1	9	1	0	11	0	7	7	0	14	15	5	1	0	21	0	7	0	0	7	53
7:30 AM	0	24	1	0	25	0	16	7	0	23	17	7	3	0	27	2	4	0	0	6	81
7:45 AM	1	16	2	0	19	1	16	10	0	27	15	5	8	1	28	2	7	1	1	10	84
Total	4	55	5	0	64	1	45	25	0	71	55	19	13	1	87	7	20	1	1	28	250
8:00 AM	0	17	1	0	18	1	7	9	0	17	16	5	8	0	29	5	5	1	2	11	75
8:15 AM	3	13	1	0	17	0	21	7	0	28	14	5	4	0	23	4	3	4	0	11	79
8:30 AM	1	7	1	0	9	0	16	16	0	32	12	6	3	0	21	1	6	2	0	9	71
8:45 AM	1	11	0	0	12	0	18	5	0	23	15	4	5	0	24	1	3	1	0	5	64
Total	5	48	3	0	56	1	62	37	0	100	57	20	20	0	97	11	17	8	2	36	289
BREAK																					
4:00 PM	9	21	1	0	31	0	18	22	0	40	8	3	2	0	13	8	17	2	0	27	111
4:15 PM	5	21	2	1	28	1	17	23	2	41	16	1	5	1	22	11	18	4	0	33	124
4:30 PM	6	17	2	0	25	2	13	23	0	38	9	0	7	0	16	13	26	7	0	46	125
4:45 PM	8	25	2	0	35	1	10	15	0	26	11	6	1	1	18	16	32	5	0	53	132
Total	28	84	7	1	119	4	58	83	2	145	44	10	15	2	69	48	93	18	0	159	492
5:00 PM	3	19	1	0	23	1	24	20	0	45	10	7	5	2	22	15	32	12	0	59	149
5:15 PM	5	21	1	1	27	0	22	17	0	39	19	4	1	1	24	30	35	5	2	70	160
5:30 PM	7	23	1	0	31	2	21	19	0	42	14	5	3	0	22	24	40	6	1	70	165
5:45 PM	0	13	1	1	14	1	19	17	0	37	13	1	3	0	17	25	37	9	1	71	139
Total	15	76	4	2	95	4	86	73	0	163	56	17	12	3	85	94	144	32	4	270	613
Grand Total	52	263	19	3	334	10	251	218	2	479	212	66	60	6	338	160	274	59	7	493	1644
Apprch %	15.6	78.7	5.7	0.9		2.1	52.4	45.5	0.4		62.7	19.5	17.8	1.8		32.5	55.6	12.0	1.4		
Total %	3.2	16.0	1.2	0.2	20.3	0.6	15.3	13.3	0.1	29.1	12.9	4.0	3.6	0.4	20.6	9.7	16.7	3.6	0.4	30.0	
Cars, PU, Vans	52	262	19	3	333	10	251	218	2	479	211	66	60	6	337	160	274	59	7	493	1642
% Cars, PU, Vans	####	99.6	####	100.0	99.7	####	####	100.0	####	100.0	99.5	100.0	####	####	99.7	100.0	100.0	####	####	100.0	99.9
Heavy Trucks	0	1	0		1	0	0	0		0	1	0	0		1	0	0	0		0	2
%Heavy Trucks	0.0	0.4	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1

Project ID: 15-9029-002
Location: Boylston Dr & Hilderbra
City: Sandy Springs

PEAK HOURS

Day: Wednesday
Date: 1/28/2015

AM

	Boylston Dr Northbound				Boylston Dr Southbound				Hilderbrand Dr Eastbound				Hilderbrand Dr Westbound				
Start Time	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM to 09:00 AM																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
7:30 AM	0	24	1	25	0	16	7	23	17	7	3	27	2	4	0	6	81
7:45 AM	1	16	2	19	1	16	10	27	15	5	8	28	2	7	1	10	84
8:00 AM	0	17	1	18	1	7	9	17	16	5	8	29	5	5	1	11	75
8:15 AM	3	13	1	17	0	21	7	28	14	5	4	23	4	3	4	11	79
Total Volume	4	70	5	79	2	60	33	95	62	22	23	107	13	19	6	38	319
% App. Total	5.1	88.6	6.3	100	2.1	63.2	34.7	100	57.9	20.6	21.5	100	34.2	50.0	15.8	100	
PHF				0.790				0.848				0.922				0.864	
Cars, PU, Vans	4	69	5	78	2	60	33	95	62	22	23	107	13	19	6	38	318
% Cars, PU, Vans	####	98.6	####	98.7	100.0	####	####	100.0	####	100.0	####	100.0	####	####	100.0	100.0	99.7
Heavy Trucks	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
%Heavy Trucks	0.0	1.4	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3

PM

	Boylston Dr Northbound				Boylston Dr Southbound				Hilderbrand Dr Eastbound				Hilderbrand Dr Westbound				
Start Time	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Left	Thru	Rgt	App. Total	Int. Total
Peak Hour Analysis from 04:00 PM to 06:00 PM																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
5:00 PM	3	19	1	23	1	24	20	45	10	7	5	22	15	32	12	59	149
5:15 PM	5	21	1	27	0	22	17	39	19	4	1	24	30	35	5	70	160
5:30 PM	7	23	1	31	2	21	19	42	14	5	3	22	24	40	6	70	165
5:45 PM	0	13	1	14	1	19	17	37	13	1	3	17	25	37	9	71	139
Total Volume	15	76	4	95	4	86	73	163	56	17	12	85	94	144	32	270	613
% App. Total	15.8	80.0	4.2	100	2.5	52.8	44.8	100	65.9	20.0	14.1	100	34.8	53.3	11.9	100	
PHF				0.766				0.906				0.885				0.951	
Cars, PU, Vans	15	76	4	95	4	86	73	163	56	17	12	85	94	144	32	270	613
% Cars, PU, Vans	####	####	####	100.0	100.0	####	####	100.0	####	100.0	####	100.0	####	####	100.0	100.0	100.0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
%Heavy Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

APPENDIX F

Project Fact Sheets

FN-282

PLAN 2040 RTP Update PROJECT FACT SHEET

Short Title	SR 9 (ROSWELL ROAD) - ITS SYSTEM EXPANSION/CONGESTION REDUCTION AND TRAFFIC FLOW IMPROVEMENTS FROM ATLANTA CITY LIMITS TO ABERNATHY ROAD
GDOT Project No.	0012629
Federal ID No.	N/A
Status	Programmed
Service Type	Roadway / Operations & Safety
Sponsor	City of Sandy Springs
Jurisdiction	Fulton County (North)
Analysis Level	Exempt from Air Quality Analysis (40 CFR 93)
Existing Thru Lane	4
Planned Thru Lane	4

Network Year	2020
Corridor Length	4.3 miles

Detailed Description and Justification

This project extends along SR 9 (Roswell Road) from City of Atlanta limits to Vernon Woods Drive and will install traffic adaptive signal management, enhanced vehicle counting stations and provide additional system vehicle detection as required. Intersection upgrades will be limited to components necessary to operate the traffic adaptive application. This project was identified in the adopted 2008 Sandy Springs Transportation Master Plan as projects A2, A3, and A4. The project is being funded under the Roadway Operations and Safety Program, a regional program defined in PLAN 2040 to make smaller-scale improvements along existing roadways which are the most critical for cross-jurisdictional travel. With the exception of certain systemwide programs with broad benefits across a defined geographic area, eligibility under this program is limited to facilities on the Regional Strategic Transportation System, with additional priority given to those also identified as a Regional Thoroughfare. Roswell Road is designated as a Level 1 Regional Thoroughfare.

Phase Status & Funding Information		Status	FISCAL YEAR	TOTAL PHASE COST	BREAKDOWN OF TOTAL PHASE COST BY FUNDING SOURCE			
					FEDERAL	STATE	BONDS	LOCAL/PRIVATE
PE	STP - Urban (>200K) (ARC)	AUTH	2013	**$150,000**	~~$120,000~~	~~$0,000~~	~~$0,000~~	~~$30,000~~
CST	Congestion Mitigation & Air Quality Improvement (CMAQ)		2015	**$1,841,203**	$1,472,962	$0,000	$0,000	$368,241
				$1,991,203	**$1,592,962**	**$0,000**	**$0,000**	**$398,241**

SCP: Scoping PE: Preliminary engineering / engineering / design / planning PE-OV: GDOT oversight services for engineering ROW: Right-of-way Acquistion
UTL: Utility relocation CST: Construction / Implementation ALL: Total estimated cost, inclusive of all phases

? For additional information about this project, please call (404) 463-3100 or email transportation@atlantaregional.com.

ARC

Report Generated: 12/23/2014